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TRANSACTIONS & STUDIES

of the

College of Physicians of Philadelphia

Volume 20 (Fourth Series)

Number 1 (June 1952)

Prospects for Prevention of Influenza*

By C. H. ANDREWES, M.D., F.R.C.P., F.R.S.

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I HAVE tonight three duties to perform. First, I thank you for the honour of being asked to give the James M. Anders lecture; I am most happy to be here. Second, I bear to this College the fraternal greetings of the Royal College of Physicians of London. Thirdly, I have to proceed to talk about prospects for the prevention of influenza. I shall speak chiefly about influenza vaccines and will begin with the categorical statement that it is possible to prevent a great deal of influenza with vaccines. I then proceed to qualify that statement and to admit that as yet not a great deal of influenza has actually been prevented. There are certain difficulties and problems, which I will discuss under four headings:

(1) What methods can be used for making a potent influenza vaccine and for assessing its value?

(2) How are we to know when best to give it?

(3) What strains should be incorporated in the vaccine?

(4) Is vaccination against influenza a practical, economic proposition?

(1) *Methods for making, administering and assessing influenza vaccine.*

I shall discuss this rather briefly, as my own interests have lain rather in the field of the second and third problems. One needs a vaccine containing a lot of virus to act as an antigenic stimulus. At the same time one has to avoid a vaccine which will give bad local or general reactions: non-virus protein or excess of virus might either of them lead to this result. One also desires the antigenic stimulus to be effective for as long as possible. The earliest formalinised vaccines were those we made at Hampstead as long ago as 1935; we then used lungs of infected mice. The discovery that influenza virus would grow in the allantoic cavity of fertile hens' eggs made available at once a source of virus of far higher potency and containing relatively little animal protein. Virus so grown has been the basis of all vaccines made since. One can, in one or other of several ways, concentrate the virus still further and at the same time get rid of most of the remaining animal protein. For instance, one can deposit the virus by the aid of a Sharples centrifuge and wash it: or one can take advantage of the property of the virus of adsorption on to fowl red cells and subsequent elution therefrom: or one can concentrate virus on precipitates of calcium phosphate, aluminium phosphate or those formed in other ways. Vac-

* James M. Anders Lecture XXVII, College of Physicians of Philadelphia, 8 January 1952.

cine concentrated and purified by Sharples centrifugation has been used commercially, probably more than any other. The most potent vaccines have given rather large numbers of local or general reactions; in the American study in 1943, 25 per cent of vaccinated people had general symptoms, some with fever up to 101°. Some vaccines made in England by Dr. Himmelweit at St. Mary's Hospital, and concentrated on aluminium phosphate have given good antibody rises and no troublesome reactions.

TABLE I

SERUM ANTIBODY TITER MEASURED BY HEMAGGLUTINATION-INHIBITION AND VIRUS-NEUTRALIZATION IN OVO

VACCINE	MONKEY	ANTIBODY TITER	
		Hemaggl.-inhib.*	Virus-neutral.†
Virus	1	65,000	200,000
+	2	32,000	80,000
Adjuvant	3	16,000	16,000
Virus	4	128	56
+	5	128	32
Saline	6	64	<5

* Highest dilution of serum inhibiting 4 units of hemagglutinin.

† Fifty per cent endpoint of neutralization vs. 1,000 EID_{50}.

(*Reproduced, with permission, from Am. J. Pub. Health* **41**: *675 (Table 3), 1951.*)

The most hopeful new development is that reported from Pittsburgh by Dr. J. Salk and his colleagues (1951). They have followed up earlier work on the use of oily adjuvants, and have found a non-irritating oily base (Bayol F) which, when combined with an emulsifier (Arlacel A) and a vaccine, produces antibody rises in mice, in monkeys and in man far higher and more persistent than are obtained otherwise. Some results obtained in monkeys are shown in Table I. In man, $\frac{1}{4}$ cc. doses of oily suspension are given intramuscularly and have not caused, as have earlier adjuvants, any nodules, abscesses or other unpleasant reactions. The raised antibody titre following such vaccines seems to persist much better than without adjuvant; and I understand that a preliminary field trial has given encouraging results. If no unexpected difficulties turn up, this may prove to be the influenza vaccine of the future.

Vaccines can be evaluated by their virus-content as judged by their agglutination-titre for fowl red cells; by their power of immunizing or evoking antibodies in mice and in man; and finally by their ability to prevent influenza in man. The agglutinin-titre may vary independently of antigenicity amongst virus strains and is to that extent unsatisfactory. When the right strain to use has been selected by the use of various criteria, the haemagglutinin-titre may be all right for comparing several preparations of that vaccine. A mouse potency test for vaccines is at present obligatory in the U. S. for routinely produced commercial vaccines; but its use imposes delays and increased costs in manufacture; further, one may want to use strains without adapting them to mice at all. Antibody production in human volunteers gets us a little nearer our real objective: but the normal antibody level of populations varies according to whether or not an epidemic has recently occurred, so this test cannot be standardized. Prevention of influenza in man is the real criterion. Field trials are very difficult to organise. Many conditions have to be fulfilled before those fussy people, the statisticians, are satisfied. One has to make arbitrary decisions as to what to call "influenza." There is apt to be, in January in the 'flu-season, concurrent incidence of other respiratory infections against which influenza vaccine cannot be expected to protect. One can therefore decide to use serological tests for determining what to call "influenza" and to ignore infections giving negative laboratory tests. But the vaccinations themselves may so boost antibody titres that even if 'flu occurs it will produce no further rise. It has happened in several trials that by the criterion of laboratory diagnosis, little or no 'flu has occurred in a vaccinated group, though to the eye of the uninformed clinician, respiratory infection has been as prevalent in the vaccinated as in the controls. All very satis-

fying to the laboratory worker, though less so to the clinician, and still less so to the afflicted patients. Despite these difficulties, there is agreement that influenza vaccination can achieve results. Further work and discussion are needed before we can all agree on potency tests for influenza vaccines, preferably planned on an international basis.

(2) *The questions "when to give"* and *"what strain to use"* must be to some extent considered together. In 1943 an extensive trial of influenza vaccine carried out in the U. S. A. gave very promising results (Commission 1944). About 3000 people were vaccinated in five centres. Rather equivocal results were obtained in California, but in the other four centres the incidence of influenza in the vaccinated groups was only about one-quarter of that in control groups. I hate to seem to depreciate this result by calling it 'a fluke'; it wasn't that, but there were two fortunate factors contributing to the favourable result. First, the vaccine was given only a few weeks before a 'flu epidemic appeared. We never have luck like that in England: whenever we vaccinate a group of people, there is either no epidemic at all or it keeps right away from the community concerned. The second fortunate circumstance was that the right strain was included in the vaccine. There had been a small localised outbreak in the middle west in the preceding May; the Weiss strain obtained thence was incorporated in the vaccine and the widespread outbreak in the following autumn was due to a strain closely related antigenically to 'Weiss'. We may note here that such a pattern has been seen on several subsequent occasions—a local early summer outbreak, followed by a widespread autumnal one due to a similar strain: such a sequence of events may be very helpful in permitting one to pick the right virus strain to vaccinate with.

The success of 1943 led the over-optimistic to feel that the whole problem was solved: but 1943 was followed in due course by 1947 in which vaccines proved useless in stopping influenza, both in Britain and America. There is now general agreement that this failure was due to the emergence of a new antigenic subtype of influenza—the so-called A-prime.

I had better digress here to explain the position as to antigenic types of influenza. We have first the two main types A and B, usually said to be antigenically unrelated, though some laboratory tests indicate that there may after all be some antigenic element common to the two. Then there is Influenza C: the virus of this was described by Taylor (1949) as strain 1233, though it was not till Francis *et al.* (1950) found it causing an outbreak that there seemed justification for christening it Influenza C. Present indications are that it is relatively unimportant as a cause of disease in man. Amongst the A influenza viruses are antigenic sub-types, sufficiently different from each other to affect the results of vaccination trials. The original influenza virus, the W.S. strain, isolated in 1933, stands apart from others, antigenically speaking. The strains isolated between 1936 and 1946 were all more or less closely related to the classical PR8 strain, recovered in Puerto Rico in 1935. Then there appeared, first in Australia in 1946, then in 1947, in both Europe and America, an A strain sufficiently distinct from other strains to have been christened A-prime. Vaccines made with the older A viruses proved, in 1947, useless in protecting against the A-primes. Now, strange as it may seem, these A-primes seem completely to have replaced the classical A's all over the world. How this should come about and why the classical A's should have vanished, is a mystery. I should add that several workers have claimed to have isolated classical A viruses even within the last two or three years; but Isaacs and I have lately published our reasons for suspecting that these may be contaminations or 'pick-ups' of stock viruses carried in the laboratory—a well known bugbear to workers with viruses as well as to bacteriologists.

Within the group of A-prime viruses themselves are minor antigenic differences, to be detected by refined serological methods. Thus we can usually distinguish between a 1947, a 1949 and a 1951 A-prime. The differences are

sufficiently definite to help us to interpret epidemiological findings, but probably not big enough to upset vaccination experiments. I suspect that a vaccine made from any reasonably reactive A-prime strain would protect against any other. Thus I do not share the view that the failure of vaccinations in 1947 means that they must always fail, that the virus will always be able to change fast enough to keep one jump ahead of us. Such a major antigenic change happened in 1946–47, but usually the changes are of minor character. If we prepare a vaccine against a recently current strain it will probably be useful nine times out of ten. Once every so often the virus will "pull a fast one" and we shall do no good unless we can make a homologous vaccine with great speed.

Influenza B seems rarely to cause such widespread outbreaks as does A. In Britain it has never, to our knowledge, led to one of our major peaks of influenza. Antigenically, it seems to vary less tiresomely. The original B strain of Francis, the Lee strain, stands antigenically apart from nearly all other B strains. These, even over a period of some years, have been very homogeneous. Comparisons have been made by several workers, using rather different techniques and obtaining not unnaturally rather different results. In our laboratories at Mill Hill, Bozzo (in the Press) has found that excluding the Lee strain and one or two others, all B strains obtained over several years, from all over the world, are very much alike. B seems to be a better antigen than A, so that even the rather remote Lee virus protects well, when used as a vaccine, against other B's. All in all, I feel that B is nothing to worry about, compared with A.

(3) *Timing*

Such is the position as regards antigenic variants. Now, as to the spread and the periodicity of 'flu. The epidemics seem to spread from country to country. On the other hand, there is evidence suggesting that influenza, latent in a country, may somehow be activated. This is strongly suggested by the several instances in which an outbreak has appeared in early summer only to disappear and be followed in the same area next autumn by a wider outbreak due to an antigenically similar virus. Thus, the spread of 'flu across continents and countries may be a genuine or a spurious occurrence. If it is genuine, knowledge of how influenza moves may be of great help in knowing when we should get ready with appropriate vaccines to meet an invader. Here we need at the same time knowledge about movements and about antigenic types. If a country has lately passed through an outbreak of A-prime influenza and another such is reported from a neighbouring country, there is no cause for alarm at all. For instance, in January 1951, influenza spread to Britain, apparently coming partly from Scandinavia, partly from South Africa, and it attained much notoriety in the press. Telephone calls from abroad came to our labs., including some from Scandinavia; also telegrams from South Africa. We were able to assure both lots of enquirers that they needn't worry: we had more cause to be frightened of their influenza than they had of ours.

I hope you are now prepared to agree with me that influenza needs to be studied on a world-wide basis: the problems are such as to defy solution in any other way. After some discussion of this matter at the 4th International Microbiological Congress in Copenhagen in 1947, the World Health Organisation was very ready to set up a World Influenza Centre to study such matters in consultation both with the W.H.O. office in Geneva and with those interested in influenza in the U. S. A. and other countries; this is now situated in my laboratory just outside London. We are now in contact with 'flu workers in laboratories in 46 countries. Our main concern in London is with Europe, where there are 31 collaborating laboratories; there are also 8 in Asia, 4 in Africa and 5 in Australasia. The New World is taken care of by Dr. Magill's Strain Study Centre in New York and by the Pan-American Bureau and the Influenza Information Centre in Washington. From this network of centres we obtain—or hope to obtain—very early information as to local prevalence of influenza: to

be of use it has to by-pass certain less speedy official mechanisms: we also obtain viruses; these can be typed locally, often only in a preliminary way, and then sent on to us for more detailed study. In addition we receive visiting workers from countries where influenza work is less well-organised, and we hope to be sure before long that reliable work is being done in every centre. When necessary W.H.O. organises conferences of experts to discuss problems of common interest: there will probably be such a conference in Geneva this year (1952).

All in all, things are coming along satisfactorily in Europe and in North America: but we realise more and more that we need more listening posts in the other continents to be able to understand what influenza is up to, all the time. There is the possibility that, unlike the migrant bird which follows the warmth and the sunshine back and forth across the equator, influenza follows the cold and the dark, appearing in Australia, South Africa and South America when it has left the north temperate regions and swinging back across the equator again to reach us in another winter. It does not, however, act thus with any regularity.

I can show in a few maps what we learnt from the first two European epidemics which have occurred since our centre was set up.

In the autumn of 1948 influenza appeared in a number of centres in Northern Sardinia. There had been localised outbreaks there in the preceding summer, possibly A, possibly B. Soon after it was present in Sicily and the Italian mainland, and thereafter spread north to Switzerland, Austria, France, west to Spain, north-west to Germany and the Low countries. About the New Year 1949 it reached the English Channel and duly got across to England, Scotland and later to Denmark and Iceland. Viruses obtained from Italy to Iceland and studied by my colleague Dr. Chu, were A-primes antigenically alike and a little different from the A-primes of 1947 (Chu *et. al.* 1950). We felt therefore that the evidence suggested strongly a genuine spread, all across Western Europe. The homogeneity of the viruses was rather unexpected and not, as we felt at the time, something to be anticipated in every epidemic.

In the winter of 1949–50 influenza let us well alone. In our relatively small European countries we seem to be able to rely on not being troubled by Influenza A in two successive years. Your country is so large and complex that it seems to behave rather differently—and not only epidemiologically!

Then in May 1950 localised 'flu turned up in Sweden, a finding which caused us to keep a watchful eye on that part of the world. Sure enough, after four months or so in which it was not detectable, 'flu turned up in October 1950, first in Denmark, soon after in Sweden and Norway. It apparently spread south and west to Germany and the Low countries and across to Britain, as well as to Iceland and Finland. The strains obtained were identical with those of the May 1950 outbreak in Sweden. A separate focus of a similar virus seems to have occurred in S. W. Ireland (Isaacs and Andrewes 1951).

A week or two after influenza had turned up, seemingly from Scandinavia, in Newcastle, more serious outbreaks were reported from Belfast and especially from Liverpool. Here, deaths amongst old people reached rather high figures, a circumstance which led to rather exaggerated reports in some newspapers and to some alarm all over the world. The Liverpool strain of virus was also an A-prime but readily distinguishable from the Scandinavian one, which was remarkable in reacting very poorly even with homologous sera. In Ireland the virus went south from Belfast to meet the other type coming up from the south-west. Both types turned up in the south of England, in Holland and in Italy. But along the Mediterranean generally—France, Spain, Italy, Greece, Turkey and Israel—the viruses recovered were of the Liverpool type. This made us think: and we thought still harder when it appeared that an outbreak which had occurred in Johannesburg in July 1950 was also caused by an identical virus. All these things suggest the

possibility that our influenza in Britain came from two sources—the activation of latent 'flu in Scandinavia and a spread across the equator, perhaps especially from South Africa.

Another puzzle is why influenza in England, Scotland and Ireland killed so many old people. During the four weeks of the epidemic the excess death-rate above the normal was altogether about 20,000 (Bradley 1951). Spain showed an even greater excess in deaths during the epidemic period. In Scandinavia on the other hand, the deaths from all causes were hardly affected (Freyche and Klimt 1951).

My story seems to indicate how complex it all is, and how much we need to know of the epidemiology of 'flu before we are able to use weapons of defence to the best advantage. Unless we are sure of having a vaccine with an all-embracing 'coverage' and with a long period of efficacy, we have to plan to vaccinate at the right time in the right place and with the right stuff; otherwise we shall waste a lot of eggs and effort. I hope that our international plans will help to avoid this. Personally, I feel that the best time to vaccinate in the Northern hemisphere is November, for most outbreaks seem to get going about Christmas; and that it is not worth doing in the year immediately following a widespread outbreak. At this moment I should favour using one or more good reactive A-prime strains (not the non-reactive Scandinavian one); I should leave out the old classical A strains like PR8—they were useless in 1947; I should include or exclude a B virus according to local circumstances—in England it is very doubtfully worth putting it in.

(4) Now for more *general considerations* concerning vaccines. Suppose we learn all about the spread of 'flu and its antigenic variations and suppose we get a really good vaccine giving cover for 2 years: can we, in actual fact, make such a vaccine economically and will people use it? For vaccinating against diphtheria, we have to work through the population only once; against smallpox perhaps oftener. To vaccinate millions of people against 'flu every other year would use an awful lot of eggs: and it would use a lot of buildings and man-power. Moreover, the disease is, except for the old and infirm, much less serious than are diphtheria and smallpox. Hospitals are shy of vaccinating valuable nurses if even a small proportion will go sick with local or general reactions. It is a question of balancing pros against cons and deciding on what is worth while, often on other than purely scientific grounds. If it is not practicable to vaccinate everyone, it may be worth doing people in key positions, and to have the vaccine available for those who like to pay for it, whether individuals or larger units. More important, I feel, is the need to keep an eye open for another 1918–19. We do not know why the 1918–19 influenza killed so many millions, nor even, for certain, if it was influenza A or B at all. We do not know that it will not come again. We may have faith in antibiotics to stop the secondary invaders. But these, in cases I have heard of, have been unexpectedly useless in some cases of fulminating staphylococcal infection superimposed upon influenza. And antibiotics did not stop 20,000 old people from dying during the influenza epidemic in Britain in 1951. A great advantage of using 'flu vaccine nowadays is that manufacturers are all the time getting experience and will have facilities which with proper forethought might be capable of rapid expansion to meet the threat of a killing pandemic.

There is one hopeful piece of evidence about vaccination against pandemic 'flu. It is difficult, by means of vaccination, to protect ferrets against the nasal infection which is the usual manifestation of the disease in that animal. Vaccines are, however, very effective in protecting them against pneumonia (Smith, Andrewes and Laidlaw 1935).

I have said so much about vaccines that you may feel I am a man of one idea. I should really much prefer to think that we could prevent influenza in other ways, ways to be discovered by our studies of the epidemiology and natural history of the disease. I fancy—that the influenza virus may lead a more precarious exist-

ence than we suspect. True, at times it gets going and is to be found in millions of millions over a whole continent. But then it vanishes. Why have the PR8-like viruses of 1936–46 become, as we suspect, extinct? If they have, can't we find out how to push the A-primes after them into limbo? If latent 'flu infections can at times push up from their underground hiding places and get going, can't we hope to learn how and why they emerge and how to nip them in the bud?

I believe there may be one simple way to avoid suffering from influenza. Unfortunately it is a technique difficult to apply quantitatively and at will. Even during a pandemic and certainly in an ordinary epidemic, far more people escape the disease than succumb: yet very few of the lucky ones may start with good antibodies in their sera. It may well be that if you are lucky enough to encounter first a small dose of virus, your basic immunity is stimulated enough to permit rapid overcoming of a bigger dose encountered later on. If you are less lucky, you meet a heavy dose initially and then down you go with 'flu. Table II shows an unpublished experiment on 'flu which I carried out a year or so ago. Mice were given with anaesthetic a dose of the W.S. strain of 'flu diluted 10^{-7}—a dose known to produce minimal lesions but not to kill. At intervals thereafter they were given intranasally but without anaesthetic undiluted W.S. virus. As shown this killed all the control mice. The anaesthetic was dispensed with in the challenge inoculum, since in mice with a minimal 'flu infection even broth given subsequently under ether will enhance the disease by spreading the virus over more of the lungs. One cannot therefore challenge in the usual way. The Table shows that mice challenged with a heavy dose 24 hrs. and 48 hrs. after the tiny dose had little or no resistance; but that 4 and 5 days later, perhaps even after 3 days, about half of them survived the challenge. This experiment suggests that if man behaves similarly, resistance may be engendered very quickly by contact with that little dose of virus. It is noteworthy that in civilised communities the proportion of subclinical cases is often high; whereas when 'flu is introduced to a small unit which has long been free, a high proportion of the population may go down.

Burnet has urged that the theoretically ideal way to immunise against 'flu is by intranasal inoculation of living attenuated virus. This could probably be given diluted, and produced at trivial expense compared with ordinary killed vaccines. It would be a method very similar in principle to that just discussed. Unfortunately we do not yet know how to produce an attenuated virus with the right properties.

TABLE II

PROTECTIVE EFFECT OF DILUTE (10^{-7}) W.S. VIRUS AGAINST SUBSEQUENT CHALLENGE BY STRONG VIRUS

DILUTE VIRUS ONLY	DILUTE VIRUS FOLLOWED BY BROTH	DILUTE VIRUS FOLLOWED BY STRONG VIRUS AFTER					STRONG VIRUS ONLY
		5 days	4 days	3 days	2 days	1 day	
+	†2	†2	†2	†3	†2	†2	†2
+	+	†3	†4	†4	†4	†4	†2
+	0	+	+	†9	†6	†4	†2
0	0	+	+	+	†7	†4	†3
0	0	+	+	+	†8	+	†6
0	0	+		+	†9	+	†9

†2 = mouse died 2 days after challenge.
+ = survived with lung lesions.
0 = survived without lung lesions.

Burnet's own experiments, directed to this end, were not very promising. Possibly, in the face of a really lethal epidemic, people would be ready to take a dose carrying some risk of ordinary influenza.

I do not believe that, except very exceptionally, quarantine is worth using as a means of controlling 'flu. There is a lot of evidence suggesting that though 'flu may spread from country to country, it may get about to start with as an underground movement. We may flatter ourselves that we are escaping and then it will burst out simultaneously in a number of places. Small numbers of infected persons do not seem readily and rapidly to start off an epidemic in populated towns, though they may do so in small and remote places. In cities and large countries the spread takes place in a more

subtle way, not yet comprehended. It is of interest that neither of the two recent outbreaks in Western Europe seems to have got going across the Iron Curtain.

There has been much work done both in Europe and America on disinfectant aerosols. I am myself pessimistic about their value. They can be used in circumscribed places such as offices, but you cannot, as Abraham Lincoln may or may not have said, disinfect all the air for all of the people all of the time. Those breathing clean air in their offices will probably inhale infected air in the subway or in their homes. We might perhaps do good by disinfecting crowded places and cutting down the virus-population to a level where it would tend to immunise rather than lay people low. But if we use such mists in the presence of a little virus we might do more harm than good by destroying the useful little immunising doses.

It is difficult to work effectively when one is guessing all the time. Both in the field of vaccination and of other methods of control we need much more knowledge. This I say despite the amazing progress made during the last 20 years. Of course, any day there may be an astounding new discovery in the field of virus chemotherapy, altering all our ideas about the control of influenza: but that day is not yet.

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Historical Aspects of Foreign Bodies in the Air and Food Passages*

By LOUIS H. CLERF, M.D.

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THOMAS DENT MÜTTER who bequeathed a museum and founded a lectureship in this College in 1858, did not leave behind him any written evidence of an interest in foreign bodies in the air and food passages as did his biographer Samuel D. Gross. He attained great distinction, however, in the field of surgery for clubfoot and other deformities and in plastic surgery, particularly hare lip.

The subject of foreign bodies in the air and food passages, always a source of human and dramatic as well as clinical interest, however, is not inappropriate for this occasion. The Mütter Museum houses the largest collection in the world of foreign bodies removed from the air and food passageways, The Chevalier Jackson Collection.

In reviewing the early medical literature one is impressed with the relative paucity of references to foreign bodies in the air passages. Practically all of the earlier cases were esophageal in origin. Probably the relative rarity of records of such accidents in historical literature was due to indifference or lack of imagination of the journalists as well as the medical writers of that day. While it might also be explained by evolutionary alterations in the protective function of the larynx or changes in the habits of man, the failure to recognize foreign bodies in the air passages undoubtedly was due to inadequate methods of diagnosis.

This assumption is reasonable when one reflects that thoracic percussion was discovered by Auenbrugger in 1753, but that it was not accepted generally until 1839 when Skoda further investigated this method of diagnosis and originated the doctrine on which all our notions regarding percussion are based. Also, when one recalls that auscultation of the chest was really discovered by Laennec in 1816, although the method was not unknown to Hippocrates, it will be appreciated that physical examination of the chest was not well done prior to the last century. Another factor of importance, particularly in the diagnosis of laryngeal foreign bodies in adults, was the development of mirror laryngoscopy. Although first attempted in 1829, it was not until after 1854 when Manuel Garcia invented the laryngeal mirror that satisfactory examinations of the larynx were possible.

Certain of the early records of foreign bodies in the air passages are of doubtful authenticity. Muys (1), in 1690, reported in his "Practical Surgery" a case of a child, aged 7 years, who died from suffocation three weeks after aspirating a bean. In 1759, Louis read his "Memoir on Bronchotomy" before the Royal Academy of Surgery at Paris. He collected all of the then known cases of foreign body, 28 in number and presented all that had been learned concerning the subject up to that time. His work was outstanding and created favorable comment. Although reports of cases were added to the literature from time to time no systematic or elaborate study of this subject was attempted until Samuel D. Gross (1) published his "Practical Treatise on Foreign Bodies in the Air-Passages" in 1854. This contribution, celebrated in its day, still stands as a monument to the remarkable insight and the keen powers of observation possessed by the medical men of his day. During the early part of the nineteenth century much information was accumulated and definite views were formulated concerning foreign bodies. Many of the symptoms, certain of the physical signs and other

* Thomas Dent Mütter Lecture LXIV, College of Physicians of Philadelphia, 5 December 1951.

important observations which then were made are still fundamentally sound and constitute an important part of the knowledge we possess today regarding this subject.

With the development of roentgenology the diagnosis of foreign body has become in great part a problem for the expert roentgenologist.

Could you imagine our predicament had we lived during the time when percussion and auscultation were in their infancy and either were little understood or little practiced by many physicians? Let me quote from Frederick Ryland (2), who in 1838, discussed the diagnosis of foreign bodies in the air passages. He stated:

"The diagnosis of this accident claims the most minute attention, and we must avail ourselves of every circumstance at all calculated to throw light upon the subject. The symptoms should be minutely examined with reference to making a distinction between this affection and acute laryngitis, croup or a foreign body of large size in the esophagus. From the two first it may be distinguished by the absence of fever at first, by the very sudden manner in which the symptoms come on, by the intermissions in the difficulty of breathing, which sometimes continue for an hour or two, by the noise occasionally heard when the foreign body is impelled against the vocal cords, by the excessive violence of the cough after this occurrence, and most particularly by the chief difficulty of breathing being during the time that the expiratory process is going on, whilst in laryngitis the difficulty is in the act of inspiration."

It was generally recognized that while an aspirated foreign body usually went into the more distal portions of the airway it might be stopped at the very entrance of the larynx and produce suffocation. Concerning this Gross (1) wrote:

"How many persons have perished, perhaps in an instant and in the midst of a hearty laugh, the recital of an amusing anecdote, or the utterance of a funny joke, from the interception at the glottis of a piece of meat, a crumb of bread, a morsel of cheese, or a bit of potato without a suspicion, on the part of those around, of the real nature of the case! Many a coroner's inquest has been held upon the bodies of the victims of such accidents, and a verdict rendered that they died by the visitation of God, when the actual cause of death lay quietly and unobserved at the door of the windpipe of the deceased."

Of great interest are the accidents resulting when live fish held in the teeth are either aspirated or swallowed. Many primitive people as well as natives in many tropical countries have a habit of killing fish by crushing the head with the teeth or by holding the fish between the teeth so that both hands may be free to bait the hook. Not infrequently the fish in its struggles slips into the fisherman's mouth and either lodges in the pharynx, the esophagus or larynx.

In a thorough review of the literature Gudger (3) collected 31 instances of lodgment of live fishes in the air and food passages. In none of these was an attempt made to remove the intruder by endoscopic means.

The earliest strictly medical report of a case of live fish impacted in the throat was presented by Dr. Eitner of Steinau, Germany in 1850. A man, aged 48 years, of large stature and strong constitution, who was given to drink, was the victim. One day, when in "his cups" he scolded his wife because she had brought to the house for his meal some very small fish. Boastfully declaring that one does not need first to cook such small trifles, one can swallow them just as they are, he followed words with actions and successfully swallowed a small live fish. Urged on by his success and anxious to further show his prowess he took another fish, unfortunately a small perch this time and decided to try it as he had the former. This fish, however, was too large to venture further than the pharynx. Here it set out its fin-rays and stuck fast. This rather large object cut off breathing and within a half hour the man died before medical aid could reach him.

Cobbold (4) in 1863 wrote that in the anatomical museum of Edinburgh University there is preserved a whole fish 8 inches long and $2\frac{1}{2}$ inches broad, which many years previously

caused the death of a fisherman. The man was in a boat, drawing the net and having his hands engaged, he seized the fish by his teeth to prevent its escape through the meshes. A sudden convulsive effort carried it down his throat and after death the head was found within an inch of the cardiac orifice of the stomach. The man died from suffocation before the boat reached the shore.

Another fish story is recorded by the French physician Gautier (5) and is dated 1785. The accident occurred in Poitou on the Biscay coast. A prosperous farmer with his servants, went to sea to fish and as is customary among the inhabitants in this region the small fish were held in the teeth of the fisherman. It seems that after the sixth try of the net he caught a small fish which he put between his teeth in order to hold it better. The fish freed itself and before anyone knew what happened it had slipped into his trachea. Attempts were made to grasp the tail of the fish to draw it out but all in vain. When Gautier saw the patient he was practically expiring. The doctor held the patient's mouth open with a bit of wood and with the examining finger encountered the tail of a fish at about the level of the epiglottis. An attempt was made to extract the fish but he succeeded in pulling off the tail only. There was nothing to do but open the trachea, but the people would not consent to this operation and the patient died in less than two hours after the accident. Gautier remarked that few years go by without such accidents taking place.

There is an interesting account of a native of India, who, while fishing, caught an eel-like fish about 15 inches long. In attempting to kill the eel by biting off the head it slipped into his gullet and because of its short fins it could not be withdrawn. The man died one hour later in the greatest agony. So firmly was the eel impacted that even after death it could not be extracted and it was necessary to bury him with the eel protruding from his mouth.

Curiously, in every case of impaction of a live fish in any portion of the air or food passages, the intruder enters head first. This is very naturally to be expected since it is impossible to swallow a fish tail foremost because of the direction of the fins. Birds who live on fishes are aware of this.

It was long known that foreign bodies were found more often in the right bronchus than in the left. Although many ingenious explanations were offered to account for this, to Mr. Goodall (6) of Dublin (1844) belongs the credit of having directed attention to the part played by the septum or carina in influencing the passage of foreign bodies in their descent to the bronchi. Gross concurred in this explanation. Browne (7) of Dublin, was of the opinion that impaction of foreign bodies in the air passages occurred less frequently in children than in adults. Gross' experiences did not corroborate this view, for he stated: "It is to be regretted that this gentleman has not furnished us with his reason for this opinion for which I think there is certainly not the slightest foundation in truth." The observations made by Gross have been amply substantiated.

The importance, from the standpoint of diagnosis, of a careful inquiry into the history of every case that is brought under the physician's observation was frequently emphasized by Gosss (1). Attention was directed to the first paroxysm, notably cough and a sense of suffocation which occurred with aspiration of the foreign object. Concerning the absence of symptoms, the so-called symptomless interval, it was noted that cases occasionally occurred in which the appearance of symptoms following the first paroxysm might be postponed for an unusually long period. M. Louis in his Memoir cited the case of a patient, who after the first few minutes did not experience a bad symptom for an entire year. At the end of that time he coughed up a cherry stone. In the case of Struthers (8), after choking on a bone, the only symptom to suggest anything amiss in the chest was slight cough and wheeze. After 15 months, so slight were the disturbances of respiration that several surgeons, including Sir Benjamin C. Brodie, expressed the opinion that "the case was one altogether of chronic cough from which recovery might soon take place."

The occurrence of wheezing respiration and

of other asthmatic manifestations was recognized by Struthers, Gross and others. In this connection the case of Dr. John M. Nooth (9) is remarkable:

"He was seized while on duty in Quebec in 1838, with an asthmatic affection which came on almost every day for some months; it consisted of pain and a sense of weight in the left side of the chest, together with some difficulty in breathing. A few months after the first seizure there came on, in addition to other symptoms intermittent pulse and irregularity of the heart's action. He was persuaded to return to England, and two years from the commencement of a series of asthmatic attacks he arrived in London. Soon after his arrival he went to the theater. The house was crowded, and very hot; his cough became unusually severe, his respirations difficult and the irregularity of the heart's action much greater than ever. Under these circumstances, he went home and retired to bed very ill and in great distress. Lying with his face downward he continued coughing and spitting phlegm and toward morning he discovered that he had spit up a large leaden shot, about an eighth of an inch in diameter. In ten or twelve days afterwards the expectoration and cough had quite ceased and the pulse had become regular. Dr. Nooth could not be certain how this shot got into the air passages, but he remembered that he was one day seized immediately after drinking the last glass of a bottle of wine, with a convulsive cough, which continued to be troublesome for some days after and this was previous to his experiencing any uneasiness in the chest."

The significance and the mechanism underlying the production of obstructive emphysema was first described by W. F. Manges (10). Emphysema of the lung occurring in foreign body was described by Lescure (11) who observed the lungs of a girl, age 4 years, who died 60 hours after impaction of a piece of almond shell in the upper part of the trachea. The lungs were emphysematous in their entire extent, but the air had not reached the external surface of the body. In Ormerod's (12) case the left lung had been rendered emphysematous over a considerable portion of its outer surface from general dilatation of the air cells caused by a pebble lodged in the trachea at the bifurcation. The occurrence of subcutaneous emphysema, a rare complication of foreign body in the air passages was first described by M. Louis in his Memoir (1759). He was asked to see a patient, a girl aged seven years, two days after she had choked on a kidney bean, and the presence of marked dyspnea led him to advise tracheotomy. On returning from his home two hours later, prepared to operate, he found well marked emphysema on each side above the clavicles. The child's parents refused operation and death ensued within three days. Louis' description of the mechanism underlying the occurrence of the emphysema is still regarded as authoritative and his account of the microscopic pathological findings is most interesting and instructive. I was unable to find any reference to obstructive atelectasis; however, drowned lung, pulmonary abscess and the phthisical lung, undoubtedly bronchiectasis with pulmonary fibrosis are described most accurately.

Allan Burns (13) was one of the first, if not the first, to notice the tendency for foreign substances, under certain conditions, to play up and down the trachea. In his observations in the case of a patient who had inhaled a plum stone he noted that during inspiration the foreign body descended with rapidity along the trachea to the bifurcation; during expiration it was again forced up into the larynx but could not by any effort be projected through the glottic chink. During its descent and ascent it was productive of a tickling sensation along the course of the trachea. No reference was made by him to the sudden blocking of the airway when the foreign body was brought into contact with the larynx. Mr. Cooper (14) expressed the opinion that in all of these cases a flapping noise is almost always heard over the cricoid cartilage. It could be discerned by placing the ear upon the structure and was produced by the foreign body striking against the rima of the glottis. Dupuytren in 1835, stated: "There is a sign which I deem as characteristic

of the presence of those bodies (foreign bodies in the trachea). It is a sensation of their striking against the sides of the canal which may be readily perceived both by the hand and the ear." These signs are now recognized as being absolutely characteristic and diagnostic of a migratory foreign body in the trachea.

From the foregoing it may be seen that many of the observations made by the earlier writers concerning the symptoms and signs of foreign body in the air passages were remarkable in their accuracy. While the development of roentgenology has changed our concepts of certain of these observations one still can accept the principles enunciated by Gross concerning symptoms as fundamental.

The methods of treatment applied in Gross' time were interesting if not particularly effective. They were considered from a medical and surgical standpoint. Under medical treatment there were employed measures to promote the expulsion of the foreign body and to prevent the effects induced by the presence of the foreign substance. The former consisted largely of the use of emetics and sternutatories; for the latter, bleeding, expectorants, purgatives and counter-irritation were employed.

There were those who believed that spontaneous expulsion would relieve the patient of the intruder, particularly if nature was aided by additional forcible means, as inverting the patient or slapping him on the back. Gross did not approve of these procedures as there was always the risk of suffocation occasioned by lodgement of the foreign body and spasm of the larynx. He advanced the same objections to the use of emetics.

Sternutatories for the rejection of foreign bodies appear to have been employed at a very early period in medicine. Satisfactory results must have been rare since but one successful case was recorded. Gross suggested that this class of remedies might be beneficial if used in conjunction with chloroform. Under light narcosis irritation of the Schneiderian membrane with snuff or other substances would induce sneezing. With the air tubes in a state of complete relaxation it is easy to see how the foreign body might be ejected. As Gross stated: "Nature would be taken, as it were, by surprise."

On the basis of experience gained by Gross and others the opinion was generally held that the only real safety of a person laboring with a foreign body in the air passages consisted in bronchotomy. The hazard of foreign body, particularly suffocation, was in this way averted as the artificial aperture effectually permitted the patient to breathe with greater freedom and at the same time permitted the foreign body, if it did not escape at once, to remain in the air tubes with comparative impunity. It is of interest to note that Theophilus Bonetus recommended bronchotomy in 1650 in the case of a boy who had inhaled a piece of bone. He was overruled by the medical attendant and the child died from the effects of the accident. The first recorded case of this operation for relief from foreign body was detailed by Verduc in his "Surgical Pathology" published in 1717. A fragment of bone was extracted through the free incision in the trachea.

It was not until Gross voiced his convictions so positively that opening of the trachea became the accepted method of treatment of foreign bodies in the air passages. It would have required courage for one to do otherwise after he clearly enunciated the "important practical precept to resort to bronchotomy in all cases, the minute it is known that there is a foreign substance in the windpipe." This opinion was concurred in by the writers of that day and the trachea was opened if the surgeon arrived before the foreign body was expelled spontaneously.

On June 1, 1882, J. R. Weist (15) reported on a study of 1000 cases of foreign bodies in the air passages to determine the propriety of bronchotomy in such accidents. This presentation was made before the American Surgical Association at its meeting in Philadelphia. Weist undertook this study when he found that his results in these cases were so greatly at variance with the reports of a similar kind previously published. Of 937 cases, 599 were not subjected to bronchotomy with a mortality rate of 23.2 per cent. Bronchotomy was per-

formed in 338 with a mortality of 27.42 per cent, a difference of over 4 per cent in favor of non-interference. His conclusions are interesting. He believed that "bronchotomy should be resorted to when symptoms of suffocation are present, when a foreign body is in the larynx and there is associated dyspnea and in movable tracheal foreign body. When the foreign body causes no dangerous symptoms bronchotomy should not be performed."

The treatment of foreign bodies in the esophagus presented an entirely different problem. Until Gross presented his views on the subject it was of common occurrence to use some form of bougie to push the offender downward into the stomach. In fact in one of the very early cases reported from India, a certain gentleman used his cane to aid the progress of a mass of meat on its way to the stomach. Gross advocated the use of curved forceps, blunt metallic hooks, piece of wire formed in a noose or with a piece of whale bone or a gum elastic catheter furnished with a stylet or having a piece of sponge, or linen ball or something similar attached to its lower extremity. A number of ingenious instruments were devised, notably the Gross probang and the Graefe coin catcher. An interesting case is reported by Adelman (1884) who recalled the case of a man who had swallowed a piece of mutton with some of the bone. Attempts at extraction with forceps and at propulsion with the sponge probang having failed, Graefe's coin catcher was tried. This instrument was passed below the foreign body, but became so tightly wedged that it could not be withdrawn; the unfortunate patient remained with this additional foreign body in his gullet for more than two days. The coin catcher was finally loosened by means of a gum elastic catheter, which was threaded over it and when the impacted instrument had been gotten out, the original foreign body was pushed into the stomach. The patient succumbed about a fortnight after the first accident, but quoting Adelman it "does not seem that the fatal result was in any way caused or accelerated by the surgical mishap."

Occasionally kneading was resorted to. In a case in which the patient was threatened with asphyxia through the impaction of several large pieces of potato in the esophagus Dupuytren managed to pinch the gullet with his fingers through the neck so as to crush the potato and thereby enable it to be swallowed.

Passage of a tube into the esophagus or stomach was inspired by the sword swallowers while examination of the larynx, trachea and bronchi was inspired by the results secured by use of the laryngeal mirror, intubation and catheterization of the larynx and trachea.

Hippocrates first suggested intubation of the larynx and trachea in cases of impending asphyxiation. This procedure was further emphasized by Desault in 1801 when he erroneously passed a feeding tube into the trachea of a patient. As a result of this accident he was able to demonstrate that the trachea would tolerate the tube for an indefinite period of time. Horace Green (16, 17) who in 1828 attempted medication of the larynx, ultimately became adept in catheterization of the trachea and bronchi. He discovered that the mucosa of the larynx and tracheobronchial tree became tolerant to foreign substances. He reported his results before the Medical and Surgical Society of New York in 1847; his claims were condemned as "an anatomical impossibility and unwarrantable innovation in practical medicine." He was requested to withdraw from membership in the Society. In 1858 Bennett of Edinburgh described the introduction of catheters into the bronchi of seven patients. He injected the lungs eleven times and used as much as one half ounce of an eight per cent solution of silver nitrate.

The first attempt to visualize the esophagus is credited to Bozzini who began his experiments in 1795 and several years later reported that he was able to see its upper end. The esophagoscope was perfected sometime in advance of the bronchoscope. Jackson mentions he had the privilege of watching Mackenzie use a skeleton type of esophagoscope in 1890.

While attempts were made over 200 years ago by Levret to visualize the interior of the larynx with a polished metal disc and Fisher of

Boston in 1825 attempted to perform laryngoscopy with the aid of candlelight it was not until 1854 when Manual Garcia introduced indirect laryngoscopy and beginning with this, attempts were made to visualize the trachea. Those who did esophagoscopy believed that if a rigid tube could be passed into the esophagus it might also be passed into the larynx and trachea and on one occasion Rosenheim actually passed his esophagoscope into the trachea by mistake and was able to see the bifurcation but failed to appreciate the significance of his error. Kirstein (18) performed his first direct laryngoscopy during April 1895 and was able also to inspect the upper trachea. He stated in connection with examination of the trachea that the lower half is an exceedingly dangerous region. The walls, especially the left, pulsated rhythmically and while this was impressive to watch it called for the greatest caution in the use of rigid instruments. Later in 1895 Killian deliberately passed a 9 mm. tube into the bronchus of a male adult. Two years later he removed a piece of bone from the right main bronchus of a man aged 63 years. This probably is the first actual removal of a foreign body from the lower air passages by an endoscopic tube. Collidge at the Massachusetts General Hospital on May 11, 1898 performed the first successful bronchoscopy in this country at which time he extracted the tubular portion of a tracheal cannula from the right main bronchus of a man aged 23 years. He employed a urethroscope one half inch in diameter and passed it through the tracheal fistula. Practically all of the work up to this time was performed with the source of illumination placed externally and reflected by some means down the tube into the airway as well as into the food passages. In 1902 Max Einhorn introduced the idea of the auxiliary tube in the wall of the esophagoscope as the light carrier. This marks the first employment of a distally illuminated tube.

Subsequent to this Ingals, Jackson and Mosher utilized the Einhorn arrangement for distal illumination. Ingals reported the removal of two foreign bodies in 1904 using the Killian tube. In 1905 Jackson (19) reported the successful removal of bronchial foreign bodies. It is interesting to note that both Ingals and Jackson used an obturator in their bronchoscopes in the early days. They introduced the tubes with the same technique as is employed in the passage of the O'Dwyer intubation tube. They also did their endoscopic examinations with patients in the sitting posture.

It is difficult therefore to indicate who invented these tubes. Hippocrates suggested placing a tube in the larynx and trachea to prevent asphyxiation. Practically 150 years ago it was demonstrated that a tube could be passed into the trachea although this was done accidentally. With inspection of the larynx it became apparent to all using this method that it would be desirable to be able to advance beyond the level of the vocal cords and with the development of esophagoscopy the necessary tubes were available so that later the same principles were applied to inspection of the air passages and as a result bronchoscopy was developed.

Green's discovery, O'Dwyer's observations made in connection with the intubation tube and the invention of the incandescent electric light contributed greatly to direct examination of the larynx and tracheobronchial tree.

Killian is credited as the one who first did successful work in bronchoscopy. The idea of using a tube, however, was not his for this work had been investigated by Kussmaul who concluded that it was possible to pass large tubes into the food passages. Killian discovered and made known the fundamental work of Kussmaul who did not publish an account of his studies and as a result Kussmaul did not receive the credit and Killian did. To Jackson must be given the credit for improving the instrumentarium and bringing it to its present high state of perfection. In addition he made peroral endoscopy an important part of medical science, popularized the method among the medical profession and also made them "foreign body conscious." As a result a successful plan of treatment of foreign bodies in the air and food passages has been perfected and the

mortality rate has been reduced from a frightfully high level to a rate not exceeding 1 to 2 per cent.

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An Analysis of the Richmond, Virginia, Multiphasic Health Examination Program*

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THE term "multiphasic screening" has attracted national attention. "Multiple screening," "multitest screening," et cetera, synonymous of the above, are catchy terms which, in themselves, have stimulated public interest. However, the applied technique is not new, nor is there anything new in the application of multiphasic laboratory test procedures to mass population groups. Since the early hookworm surveys in the early part of the century, the linkage of laboratory tests has been used as a screening device. In this instance, blood smears were made for the detection of malaria at the time stool specimens were collected for hookworms. Other combinations of tests have also been used.

In the latter part of the thirties in Richmond, Virginia, serologic tests for syphilis and mass x-rays for tuberculosis were coupled in a survey of our tobacco industries. During the war years the same idea was applied in Savannah, Georgia—spreading later to other areas. Blood sugars for diabetes were soon added to the two procedures mentioned above. It is now well recognized that the application of accepted and clinically reliable test procedures to masses of apparently well persons is an accepted case finding procedure.

Only a few years ago, Dr. Lester Breslow and his associates in San Jose, California, coupled four tests in a program designed to screen individuals in industry.[1] In the spring of 1949, the Division of Chronic Diseases of the United States Public Health Service was planning five mass population surveys to test the principle of multiple test procedures. The urban projects were Framingham, Massachusetts; Flattermouth, Indiana; Atlanta, Georgia; and Richmond, Virginia. The Richmond project was the first large scale mass screening program to get under way. This will be discussed in greater detail later in this paper.

"Screening", as used in connection with multiphasic testing, is the application of presumptive laboratory tests and clinical procedures to an individual to detect suspicious evidence of a disease or abnormal condition. If evidence warrants, definitive diagnostic procedures can then be carried out to establish whether or not the suspect becomes a case. "Screening" is not in itself a diagnosis, but one of the technical steps or factors influencing the decision or medical judgment of a physician. Whereas the definitive diagnosis must be made by a physician, the screening steps may be made by the technician or someone given proper training.

The objective of a mass screening program is to detect the presence of one or more asymptomatic diseases in individuals being screened. It is the outgrowth of the recognition by the medical and related professions of the necessity of approaching the ever increasing chronic disease problem with a combined community effort. The results of delayed diagnosis and treatment are a high mortality and morbidity rate in a community. The early detection of diseases, while they are still in the asymptomatic stage, would mean less needless suffering, less loss of life and unnecessary expenses. Early detection would

* Read by Dr. Holmes before the College of Physicians of Philadelphia, Section on Public Health, Preventive and Industrial Medicine, 23 November 1951.

[1] Canelo, C. K., Bissell, D. M., Abrams, H., and Breslow, L., A multiphasic screening survey in San Jose, California Med. 71: 409–413, 1949.

reduce the burden on community taxpayers and prolong the productive life of the worker. It would mean a decrease in the length of the hospitalization period, relieving these facilities for more pressing needs. Few patients can bear the financial burden for each examination; besides, there have not been physicians in sufficient number interested in doing such work as periodic health examinations.

In Richmond's project tests were conducted for the following conditions: syphilis, tuberculosis and other chest conditions, heart diseases, hypertension, anemia, diabetes, obesity, visual acuity and intraocular tension. In addition, every tenth person was given an electrocardiogram with twelve leads as a part of a special study. The program was designed to evaluate the technique, to test its practicability and to determine whether or not the procedures could be applied on a nationwide basis.

The Richmond community in which the multitest program was conducted includes both the area within the city limits and the settlements surrounding the immediate boundaries of the city. The population of this total area approximates 250,000. The ecological factors within this area run the breadth and depth of diversification. Of particular interest and importance are the activities of community services. Those particularly concerned with health include the Health Department, the Medical Societies, the Medical College of Virginia and the public and private social welfare agencies.

The Richmond Area Community Council, one of the oldest councils of social agencies in the country and composed of eighty-two social welfare member agencies, served as the sponsoring community agency for the clinic; thus, it was within its Health Division that the multitest program was planned and organized.

At the request of the Health Department, the Council called a conference in the late summer of 1949 to discuss the possibility of a multitest clinic. Present at the meeting were representatives of various health and health related organizations.[2] The proposal of a multitest screening program was enthusiastically accepted and twelve organizations agreed to cooperate and finance the project.[3] Three major committees were immediately formed and began their work: The Medical Advisory Committee, the Planning and Steering Committee and the Health Education and Promotion Committee.

Following three trial runs, at which time technical difficulties were worked out to assure a smooth system, the clinic was opened to the public on January 3, 1950. The first location of the clinic was a large department store. At the end of the second month, the clinic was set up in a trailer-truck and moved from one location to another—industry, business districts, neighborhood groups, etc. For the last six weeks of operation the clinic returned to the original location.

The results of the tests, normal as well as suspicious, were mailed to the doctor named by the screenee. After allowing sufficient time for the report to reach the doctor, a postal card was sent to the individual informing him that the report had been mailed and requesting him to contact the doctor to learn the results. Diagnostic work was then performed if necessary.

The physician interpreted the findings, rechecked those he felt were abnormal for the person and returned the record to the City Health Department with notation as to whether these results were normal or indicated pathology. In the latter event, the doctor gave his diagnosis and stated whether the con-

[2] Health Division, Richmond Area Community Council; committee of citizens; Richmond Academy of Medicine; U. S. Public Health Service; Virginia State Department of Health; Richmond City Health Department; volunteer social and welfare agencies.

[3] Richmond City Department of Health; Health Division, Richmond Area Cummunity Council; U. S. Public Health Service; Virginia State Department of Health; Richmond Tuberculosis Association; Instructive Visiting Nurses Association; Virginia Diabetes Association; Richmond Chapters of the American Red Cross, American Heart Association, American Cancer Society, Mental Hygiene Society of Virginia; Richmond Academy of Medicine.

ditions were previously known. The findings were then entered on all copies of the records.

The project was financed chiefly out of the funds of the City Health Department and local volunteer agencies.[4] The actual budget was $67,464.90. If items such as volunteer service, part-time workers and consultation services were included, the budget would have approximated $97,000. Of the 37,000 persons tested, the cost per person was only $1.79.

The group screened in Richmond was considered by the Statistical Section of the United States Public Health Service and by the statisticians of the Health Information Foundation to be a random sample for the population covered by the survey as given in the 1940 census. However, due to the method of conducting the clinic on a volunteer basis, one would expect more non-working females, especially of the white race, to be present in the survey. This was verified by a comparison of the percentage age-breakdown of the persons actually attending the clinic to a similar percentage age-breakdown for the Richmond population.

To determine the socio-economic level, the Kinsey formula was used as a crude index: grade school 1–8; high school 1–4; college 1–4; we found that we were slightly overloaded in the college level group for white females, negro males and especially negro females. We further discovered that, despite our mobile unit serving industrial areas, we had not screened as many individuals in the lower economic group as would have been desirable. We believe that if the survey is ever to be repeated, two or more team units should be operated; one to contact industrial populations; one to function in neighborhoods populated by the lower income group and a third to be centrally located. The group studied should then become a more completely random sample as to the socio-economic characteristic.

Considering the results to date, it is interesting to note that one of the most interesting side lights of the Richmond multi-test clinic was the fact that less than one-tenth of one per cent of those screened failed to report to their physician to receive an interpretation of test results. We believe that this constitutes a land-mark in public health clinic work and evidences implicit confidence on the part of the public in their health department and their family physician.

On initial screening, the number of suspects for one or more of the nine diseases screened presents the most interesting figure. Of the 37,609 reports tabulated, 13,113 individuals, or 35%, were suspects for one or more diseases. Out of this group 16,849 suspicious incidents of diseases came to light, or a rate of 448 per thousand screened. In 37,609 individuals 24,496, or 65.13%, had no abnormalities; 10,013, or 26.62%, had one; 2,519, or 6.70%, had two; only one individual had five abnormalities.

Certain facts, however, are apparent from the results of the screening tests themselves. The Kahn presumptive test segregated 322 persons for further investigation. This gives 0.8% of the group segregated by this procedure. From past experience in this area, one would have expected approximately 2% to be so assorted. The test procedure itself could not have accounted for this change because, during the interval, the laboratory satisfactorily completed its rating tests and in the work for the Venereal Disease Clinic, the results were not at odds with the clinical evaluation experienced.

The urine test for diabetes segregated 347 positive reactors and 170 doubtfuls from 35,010 tested. The percentage (1.4%) segregated by this study is considerably lower than was experienced by Dr. Breslow, *et. al.* in San Jose, California.

Hemoglobin determinations were done by a Dare Hemoglobinometer. Out of 37,081 tested, 4,914 had readings under 12 gram per cent,

[4] Federal, salaries and grants-in-aid, $24,166; Richmond Tuberculosis Association, $22,240.90; Richmond Heart Association, $4,600; Richmond Chapter, American Red Cross, $6,900; Richmond City Health Department, $5,058; State Health Department, Research Grant, Cardiac Program, $4,500.

this being considered as low level for normal. A separate study is at present underway to investigate this further.

Blood pressures were taken on 37,177 persons with similar clinical conditions existing for all persons tested. Using 150/100 as high limits, there were 5,370 persons with an elevation of either the systolic or diastolic over these levels; and of these 1,667 had both systolic and diastolic higher than these levels. Sufficient follow-up reports are not available to evaluate these as to case rate; however, a study is being made regarding these results and to correlate them with other findings. Using twelve leads, there were 3,125 persons given electrocardiograms. Of these 3,018 have been read and verified. Definite abnormalities were found in 194, and 229 gave readings that were doubtful. A further study is in progress to determine not only the significance of these doubtful readings, but also the relative values of the various leads employed.

There were 30,432 chest x-rays taken which were read for total pathology. Of these, 1,290 were classified abnormal as to findings pertaining to the lungs and 1,561 as to cardiac abnormalities. Of the 1,155 re-x-rayed, 496 showed definite pathology due to tuberculosis and 300 showed other abnormalities. There were five cases of active tuberculosis and 34 that were suspected of being active. The largest single group was 326 persons diagnosed as inactive minimal pulmonary tuberculosis. It is difficult to compare these findings with previous results as, heretofore, in this area, mass studies have only been on limited groups. However, pooling all previous results, this clinic uncovered far more healed tuberculosis than has been previously suspected to exist.

Of the cardiac suspects 245 have been re-x-rayed, but only 32 of these were ruled out as negative by use of larger films. Correlations with blood pressures, electrocardiograms, etc., are being made.

The tonometer test for interocular tension was performed on 2,987 persons Preliminary results show that the test pulled out 40% of which only 9% had pathology—certainly not a very specific test. A re-evaluation and definitive study of this test and re-examination of the persons examined was to be undertaken to develop a truer picture of this condition but as yet no funds have been made available for this study.

Specific clinical and statistical evaluations on specific conditions screened in this survey are being prepared for literature by physicians who are members of the Richmond Academy of Medicine, and who served as special consultants to the program. These men are internists, cardiologists, ophthalmologists, syphilologists, specialists in chest diseases, etc. Their findings will be published from time to time in clinical periodicals and will give more detailed information and should be of great value to men interested in particular disease entities.

We realize this is, at best, a cursory and preliminary report and evaluation of the statistical findings and that more detailed reports are needed and will be forthcoming by specific disease entity. However, we feel that the clinic has done much good in getting people to definitive examination and treatment where necessary.

The advantages of the multi-test type of clinic fall into several groups. The first of these is public education. The public is made more aware of all chronic diseases; patient-physician good will is enhanced; many persons who have lapsed from their physician's supervision have again sought him out voluntarily as a result of the publicity used in the program. The good will and cooperation between the Health Department and the local voluntary agencies is increased.

At this point, it is well to pause and evaluate the factors and subtleties inherent in multiphasic screening and it is also well to differentiate between the mass population survey concept per se and the multiple test concept. Traditionally, in American public health, we have learned to accept mass population studies

wherein an attempt is made to determine incidence and prevalence as a proven epidemiological technique. This thinking dates back to the early hookworm surveys and has continued on through the Rosenwald Fund syphilis studies conducted in the southern states, through the beginnings of the mass x-ray screening programs for tuberculosis into the present period wherein the application of multiple laboratory procedures is being used. Further, this has accustomed us to think in terms of large population segments rather than in terms of selected smaller and more specific population groups. It has also accustomed us to think in terms of studies of short duration in time; that is, studies in which the use of educational media, newspapers, radio, television, pamphlets, and such other propaganda mechanisms have been used as a magnet to attract large numbers of individuals to seek examination within a relatively short period of time. Public health workers now call this technique "the ballyhoo approach." In the application of mass screening we have sought to stimulate individuals in the population to come for an examination with the prime purpose in view of ascertaining through laboratory tests their status as to whether or not they are suspected of having a disease or abnormal condition. In turn, upon follow-up and the clarification of their status by a physician they either become a case or have been ruled out as a suspect. The pooling of such results have given us invaluable information concerning incidence and prevalence of disease in the population.

Such mass surveys have served, and are serving, a useful purpose. As will be shown from the Richmond study and the multitest clinics in Atlanta, Framingham, Flattermouth and rural Alabama, there are many facets to be considered aside from the mass testing concept. In these short term studies, data concerning the disease status of large segments of the population was achieved. Far more important were the lessons learned in the following fields: public education, physical education, community agency cooperation, administrative and laboratory techniques, which have been minimized and to a degree lost in the blatant publicity which was given these early multi-test projects. As a result of this publicity, public and medical enthusiasms reached a high pitch. Further, the idea spread to many parts of the nation prior to the complete evaluation of these studies. Consequently, in many areas, multi-test clinics were undertaken without proper community, medical and technical preparation with calamitous results.

As a result of the enthusiastic reception of multitesting, many public health workers failed to consider the subtle by-products of these early studies which were learned when these programs were evaluated. The technique has numerous possibilities which lend themselves to public health application. Multitesting can be performed to a great advantage in small appointment type clinics. Multiple tests can be used successfully in the screening of limited groups of the population, such as school and college population, welfare groups, industrial groups, and the patients attending out patient departments and other public clinics. We believe that adequately controlled clinics on a research basis with good follow-up will give valuable data concerning incidence and prevalence of chronic diseases in industry. In many areas, industrial medical services are considering the application of multiple laboratory procedures to their pre-employment examination and to their annual physical examination. Dr. John Phair, Professor of Preventive Medicine at the University of Cincinnati, and Dr. Lester Breslow, Chief of Chronic Diseases Division, California State Department of Health, are appraising this concept at present. Several large industries and labor union medical agencies are planning to adapt the technique as mentioned above.

Perhaps when the final evaluation of mass screening studies, using multiples of ten or so laboratory test procedures, is completed, it will be found that their best application is to

particular segments of the population rather than to the community at large. There are certain disadvantages to such studies on a mass population basis:

1. Such programs consume a great deal of time of the key personnel of the health department and its cooperating voluntary health agencies.

2. It takes a tremendous amount of community organization to maintain public interest and enthusiasm.

3. As it is essential that the physician-patient relationship must be preserved at all times, great diligence is required to safeguard this relationship. Thus, all reports should be directed to the family physician.

4. Case follow-up is vital. Without it the results of such studies cannot be determined and without it the clinics would be unfair to the person being tested.

In conclusion, we in the Richmond Department of Public Health, the members of the Advisory Committee of the Richmond Academy of Medicine, and the Health Division of the Richmond Area Community Council, believe that mass screening for chronic diseases has a definite place in the public health and industrial program. We do not necessarily hold that mass population surveys with their contingent "ballyhoo" is the complete answer. Rather, we believe that multiple screening best lends itself to industrial groups, school population groups, out patient departments and the indigent population surveys. We also believe mass survey techniques using multiple laboratory tests on large population groups, may be useful at periodic intervals as a crude yardstick whereby we may measure the prevalence of chronic diseases and abnormal conditions.

The History of Circulatory Research, Leading to a Wider View of the Circulation*

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IT WAS natural for me to suggest as a subject for this lecture the history of circulatory research, partly because anyone who works in St. Bartholomew's Hospital Medical College remembers always that William Harvey was a Physician of the Hospital, partly because for close on thirty years my main research interest has been the circulation, and I have explored the past literature somewhat fully in so far as it has had bearings upon that research. I make no apology for indulging in medical history to this extent, for it is eminently profitable in many ways, and it also rounds off one's acquaintance with one's subject. It is profitable not only because it brings one into communion with the great minds of the past, though that were reward enough, but also because those minds, and on occasion the lesser ones, often have something still to pass on to posterity through the medium of the receptive reader. In our foetal circulation studies at the Nuffield Institute for Medical Research, the whole of one season's queries and agenda was derived from a study of the literature from Galen's time onwards (Franklin, 1941, 1944), and with the last foetus the last query was answered and the last *agendum* changed into *actum*. Incidentally, helped by one somewhat obscure note which I remembered in Bichat (1801), we discovered a hitherto unrecognized anatomical structure, namely, the smooth muscle sphincter at the opening into the ductus venosus, after seeing in our cineradiographic records end-results of its functional activity (Barclay, Franklin, and Prichard, 1942).

Historical study also orientates one with respect to one's subject as a whole, and from time to time urges one to point out a trend which research or thought is exhibiting. It was such an urge which caused me to expand this evening's subject and to add the words, "leading to a wider view of the circulation". I hope, by a survey covering some eighteen hundred years, to show that the connotation of the word "circulation" needs to be revised and extended in the light of recent evidence, obtained mostly by biochemists, about what Rudolph Schoenheimer (1942) so felicitously styled the dynamic state of the body constituents, and about the extra-vascular movements of fluids within the higher animal organisms. For without such extension the relative importance of the various fluid movements is liable to be wrongly assessed and judgment, in consequence, to be fallacious. Further, there cannot otherwise be proper appreciation of these different movements functioning together as component parts of a single, ever-restless whole. Understanding of the present position requires reference to a long evolution of ideas, the chief points in the story including the following:

1. From the time of Galen (130-c. 200 A.D.) to that of Harvey (1578–1657) there was acceptance of the idea of a slow onward movement of fluid through the body. I am not saying that Galen initiated such a view. Inasmuch, however, as the earlier literature is very incomplete and Galen's writings remained *the* authority in medicine for so many centuries[1], it is convenient to begin in the second century, long before knowledge of the blood circulation existed.

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[1] The late Sir Farquhar Buzzard, Regius Professor of Medicine at Oxford, once pithily said that "Galen has often been blamed for thirteen hundred years of progress that did not take place after him".

Galen thought in terms of an ebb and flow of blood on the venous side of the cardiovascular system (liver, systemic veins, right heart, and pulmonary arteries, with the liver as the centre) and of a similar oscillation on the arterial side (left heart, pulmonary veins, and systemic arteries). In addition, however, to these to-and-fro movements of blood, he obviously envisaged some forward movement of fluid that was not confined to blood-vascular channels, though it occurred in part through these.

For he had to account for the facts that the body took in food and drink by the mouth and eliminated, by various routes, the fluid waste products resulting from such intake. Time is too short to summarize all his story but the chyle, according to his schema, passed from the gut to the liver, where it became venous blood and was endowed with a growth- or nutrition-promoting influence, if one may so translate *τὸ πνεῦμα τὸ φυσικόν*. Then, some of the venous blood kept passing from the right side of the heart to the left one to be endowed in this latter with a vitalizing influence (*τὸ πνεῦμα τὸ ζωτικόν*); the passage was effected, Galen held, through minute pores in the interventricular septum. Finally, a small portion of the arterial blood kept passing up to the brain and was therein endowed with a "psychic" influence (*τὸ πνεῦμα τὸ ψυχικὸν* is really untranslatable) so that an activating fluid could flow down the hollow nerves to the organs they supplied.[2] There was, thus, for Galen, and in consequence for his successors for many centuries, the idea of a slow onward movement of fluid through the body, with the cardiovascular system providing part of the total pathway for this movement, and the activities of the absorptive and excretory systems of the body coming into the picture.

Between Galen's time and that of William Harvey contributions to physiology were remarkably, most remarkably, few in total number. Among the more interesting ones were five statements about alternative blood pathways (*i.e.*, pathways other than the direct interventricular ones) from the right side of the heart to the left side, the opinions advanced by Vesalius in 1543 and 1555 respectively about the interventricular communications, and finally the discovery of the valves in veins.

With regard to the first, the pulmonary vascular circuit (but not the pulmonary blood flow as we know it) was described by the Damascene physician, Ibn-an-Nafis (*c.* 1210–1288) in the 13th century, and thereafter by Servetus (1553), Columbus (1559), and Caesalpinus (1571 and later) in the sixteenth century; Caesalpinus also introduced the word "circulation" into the literature. None of them had any idea of a copious blood stream rushing continuously through the circuit which he described, i.e., for each of them it was an alternative path for the small amount of blood which had to get from the right to the left side of the heart. Ibn-an-Nafis' and Servetus' publications, in any case, probably exerted very little influence on their contemporaries or successors. The fifth statement, by Botallus (1564), gave as the alternative pathway an opening which that author had found in calves, pigs and dogs, and—though on a relatively smaller scale—in man. What he described was, in fact, persistent post-natal foramen ovale and it is very surprising to read his claim that all the hearts which he had examined had shown it.

Vesalius' contribution—apart from his putting of body structure for the first time on a relatively modern basis—was to cast anatomical doubt upon the interventricular pathway for the blood. In the first edition (1543) of his great work, he noted that the septum abounded on both sides with pits, but that not one of these, so far as the senses could perceive, penetrated from the right to the left ventricle. In the second edition (1555) he was frankly sceptical, and did not see how even the smallest particle could be transferred through the septum.

It is indeed astounding that so strange a view of the blood movement as that so far described should have been held for a large fraction of the total recorded history of mankind. Yet there it is. The change to the modern view, or at least the essential part of that change, was

[2] *Cf.* the present-day accounts of the rôles of acetylcholine, etc., in inter-neuronal and neuro-muscular transmission.

brought about primarily by an anatomical discovery and by a correct appreciation of that discovery's physiological significance. The former was the finding of the valves in the veins. They were perhaps not seen by anyone prior to 1546; they were not adequately recognized until Hieronymus Fabricius ab Aquapendente, the greatest medical teacher of the second half of the sixteenth and beginning of the seventeenth century, saw them (1574), began to demonstrate them (1578 or 1579), and finally (1603) published his short, beautifully illustrated treatise on them. In his physiological views, however, he would not go against Galen's authority despite the mute evidence to the contrary offered by the valves themselves. For he stated that, while these structures must check to some extent the ebb of the venous blood, that ebb still occurred past them through the free channels remaining in the centres of the veins. In consequence, the next and most important step was taken by one of his students, as will be described in the section which follows.

2. William Harvey (1578–1657) amended Galen's schema by correcting his wrong ideas about the blood movement. In 1599 Harvey's Scholarship at Caius College, Cambridge, lapsed, and the following year, on St. Luke's Day, he enrolled among the pupils of Fabricius at Padua. According to Aubrey, he was "short of stature, dark of skin, with shining black eyes and hair, alert and irritable, often fingering the handle of his dagger." From other sources we know that he was reflective, with powers of concentration and detachment, and that he relied upon observation of nature rather than upon authority. "It hath ever been the delight of my Genius," he said in 1650 to George Ent, "to make strict Inspection into Animals themselves."

It is probable that soon after St. Luke's Day, in 1600, he saw the whole human body dissected twice under the direction of Fabricius in the permanent anatomical theatre which the latter had had constructed in the University six years previously. Those who recall Harvey's later quantitative assessments of heart output and blood flow may perhaps think that he was influenced not only by Fabricius, but also by Galileo Galilei, who for half a dozen years had been lecturing in the room next to that which constituted the anatomical theatre. In this latter, where Fabricius lectured at 9 a.m., there was only a moderate artificial lighting, and the closely packed spectators must thereby have had their attention concentrated upon the cadaver, lying upon the dissecting table close down in front of them; at the same time the relative darkness must have been conducive to reflective thinking[3], and one can readily imagine Harvey considering, as the greatest anatomist of the time showed the valves of the veins, if the latter had not gone wrong in the actions he assigned to them. At all events, Harvey told Robert Boyle many years later, in the only conversation these two great men had, that it was a consideration of the disposition of the venous valves which made him believe that the blood must flow from the arteries to the veins. Apart from this major outcome of his years at Padua, Harvey appears to have become one of Fabricius' favourite pupils, and even to have helped him in experiments[4]. Harvey was, however, most scrupulous in accumulating his evidence and it was not until 1616 that he made the first public announcement of his new concept, and not until 1628 that he published his small book about it.

He showed that the obvious blood movement is from heart to arteries and from veins to heart, and he postulated the arterio-venous completion of the circuit some decades before Malpighi, with his better microscopes, first demonstrated the capillaries. Harvey demonstrated also the *rapidity* and *amount* of the blood movement and its wide normal range in both respects, and showed that the motive force of the circulation was the contraction of the muscular ventricles. From that time until

[3] Nearly half a century later Harvey loved to retire in summer to the darkness of the caves which he had had made in the grounds of Coombe Lodge in Surrey, and it seems probable that it was there that he thought out his *Exercitationes de generatione animalium.*

[4] Prof. Chauncey Leake rightly stresses this point, and refers to *Exercitationes de generatione animalium, Ex. 6.*

quite recently, the heart, as the most spectacularly active part of the cardiovascular system, has received the greatest attention in accounts of the physiology of that system.

With respect to the other fluid movements, we have to note that Aselli saw the lacteals in 1622 and described them posthumously in 1627; further, that in 1651 Pecquet published his account of the thoracic duct and receptaculum chyli, and showed that Aselli's lacteals open into the duct and the duct itself into the venous system. Harvey considered that the heart distributed the products of digestion, and in 1652 he wrote that the mesenteric veins, as well as the lacteals, are concerned with absorption. In his publications, therefore, Galen's idea of movement of fluid from the alimentary canal into the cardiovascular system, and thereafter of an excretion of waste products, was perpetuated, though it was now associated with a correct appreciation of the course of the blood flow, reasonable ideas about its rapidity and amount, and acceptance of the prime part played in the propulsion of the blood by the muscular activity of the heart.

Richard Lower (1631–1691) was the Elisha to William Harvey's Elijah, and he not only showed that the blood becomes arterialized in the lungs, but was one of the pioneers in transfusion experiments, perhaps the first successful one; he also published observations on varicose veins which were republished, in ignorance, as new in the present century, gave the first account of constrictive pericarditis, and much besides. In 1669 he summarized his personal outlook on fluid movement in the following passage: "The cause of our life consists in this alone, that the blood in its continuous passage through the whole of the body carries round heat and nutriment to all the organs, and that ever-fresh chyle passes into the blood in due amount, restoring with equivalent supplies the daily loss of blood-fluid and refreshing it with its continuous inflow."[5]

[5] In this connection it is only right to mention that Lower was speaking with some authority in respect of the chyle movement, for he had done some interesting and ingenious experiments on its passage through the thoracic duct and thence into the cardiovascular system.

In the 18th century quantitative studies of the pulse rate and its variations were published by Floyer in 1707 and—much more important —the first measurements of blood pressure were published by Stephen Hales in 1733; the results led to estimates of the work of the heart and to more accurate ideas of the peripheral resistance. Knowledge of the anatomy and physiology of the lymphatic system was greatly increased by William and John Hunter, assisted by Hewson and Cruikshank, and Cruikshank's *The Anatomy of the Absorbing Vessels of the Human Body*, 1786, contained the first modern concepts of lymphatic physiology. Against these four workers is their denial of a share in absorption to the veins, but they certainly advanced interest in the lymph and its flow. The eighteenth century also saw the discovery of the cerebrospinal fluid, by Domenico Cotugno in 1774.

3. The blood circulation became more and more the dominant part of the total fluid movement picture. Anyone who studies at all analytically the progress of science must be impressed by the limitations of its exponents,[6] the often fortuitous character of the stimuli which lead to advances, and the subservience often wrongly paid to what is at the moment the fashionable research interest. The full circulation story in the nineteenth and early twentieth century suffered to some extent through these causes, but also because the heart was more spectacular and readily investigated than the arteries, the latter than the veins, and so on. We have also to remember that it was not until about 1838–9 that the so-called "cell theory", first enunciated at all clearly by Schleiden and Schwann, came into being, largely through improvements in the manufacture of microscopes. It is hard for us to picture the conditions obtaining, little over a century ago, before the appreciation of the cellular composition of the living organism.

If we attempt to summarize briefly the advances made during the nineteenth century

[6] Huxley wrote in 1894, "... the ablest of us is a child of his time, profiting by one set of its influences, limited by another."

in respect of the cardiovascular system we have to say that they resulted in increased knowledge of the heart, its innervation and its activity, and in knowledge, though to a lesser extent, of the arterial system and its innervation, and of the blood pressure in the arteries; the capillaries and the veins received relatively little attention. In addition to the above, a new field was opened up when in 1894 Oliver and Schäfer produced a rise of blood pressure by injecting an extract of the adrenal glands, and followed this up with similar work on the pituitary; it is of interest that three years later Howell, of this country (U. S. A.), investigated the action of the posterior lobe.

I should like to add a few points to the above very condensed survey. The first is that blood pressure has always been, on the whole, relatively easier to measure than blood flow, though often knowledge of flow is as important, or more important, than that of pressure. Secondly, Claude Bernard regarded blood pressure studies as fundamentally less important than studies of vascular control by the nervous system. Thirdly, at various times over the last twenty years or so of his life, Bernard stressed, in different phrases, that the object of all the body's activities was to preserve constant the internal environment, by which he meant the blood, or blood plus lymph, in contact with the cells; tissue fluid was scarcely as yet in the picture. This concept, tenuously preserved in the literature, has since proved, with modification by J. S. Haldane, W. B. Cannon, and J. Barcroft, very fructifying and deserves prominent mention in this present story.

In the nineteenth century there were additions to knowledge of the cerebrospinal fluid (Magendie, 1825; Faivre, 1855) and of the lymph (Heidenhain, 1880; Starling, 1896), but to a far lesser extent than to that of the cardiovascular system.

Knowledge of other fluid movements was advanced by the various classical studies on digestive secretions, and by the work of Bowman and his successors on the formation of urine. It seems at first extraordinary that until Bowman's publication in 1842 the nature of the renal glomeruli and a connection of the blood flow with the secretion of urine should have been unknown, but workers on the kidney will, I am sure, agree that that organ deserves, far more than the spleen, Galen's appellation of *mysterii plenum organum*, an inscrutable organ full of mystery. Separation off of fluid from the blood is implicit in the very word "secretion", but it was Bowman who established the concept and after 1842, though it was not stressed, there was tacit acceptance of the fact that the blood is modified in its course by the loss of water and dissolved substances to the renal and other secretions. However, such increase in knowledge of outside fluid movements was completely outstripped, for technical and other reasons, by the simultaneous increase in knowledge of the blood circulation, and in consequence there was, during the nineteenth century as a whole, progressively greater lack of balance between the main subdivisions of the total fluid movement picture.

This tendency continued during the first two to three, or even four, decades of the present century. During them there was an emergence of interest in succession in the minute vessels, particularly the capillaries; in the cerebrospinal fluid; in the blood volume and blood depôts; and finally, more or less contemporaneously, in the veins and the lymphatics. While, however, knowledge of these mounted greatly above previous base-lines, work upon the heart and arteries, technically more amenable to study, also increased. Hence, even though parts of the cardiovascular and allied enclosed systems hitherto little appreciated came somewhat more into their own, the physiology of those systems as a whole still dwarfed, and progressively ever more so, that of extravascular fluid movement. Before, however, I go into that, let me enlarge upon the individual parts which I have mentioned.

Significant observations about the capillary circulation had as their forerunner the important but little-known work of Ebbecke, which dealt not with the capillaries *per se* but with the minute vessels in general, and was initiated during a long voyage which he made as a ship's surgeon soon after qualifying. The results of

these and of subsequent studies were incorporated in his article on the local vasomotor reactions of the skin and of the internal organs, but this article was not published in *Pflüger's Archiv* until 1917, and both during the war and after it remained more or less unknown to English-speaking scientists. In the war itself, the problem of shock engaged those scientists and a parallel was drawn between Dale *et al.*'s findings with histamine and the more clinical observations. In the post-war period the names of Krogh and of Lewis, among others, became specially associated with work on the capillaries and on the minute vessels in general, and we recall their respective books, *The anatomy and physiology of the capillaries*, and *The blood vessels of the human skin and their responses*. Significant observations about the capillary circulation were also made by Leonard Hill in 1920, but they were ahead of time, and full acknowledgment of their intrinsic importance has had to come, comparatively recently, from the group of New York workers which includes Chambers, Zweifach, and Shorr. To this group we owe the modern concept of the arrangement and activity of the peripheral vascular field, *i.e.*, of metarteriole, thoroughfare channel, precapillaries provided with sphincters at their origins, and true capillaries and draining venules, together with vasomotion of the metarteriole and precapillary sphincters, and the production and destruction of V.E.M. and of V.D.M. The structural schema has not yet been demonstrated as universally obtaining, but film-records provide objective evidence of vasomotion where it does obtain; more debated are the claims about V.E.M. and V.D.M. What is pertinent here is that the work as a whole is focussing attention upon the neighbourhood of the tissue cell in accord with the general trend of present-day physiology and pathology[7]. Indeed, at the recent Josiah Macy, Jr., Foundation Conference on shock and circulatory homeostasis, shock was defined by Fine as "a state of persistent deficiency of flow, however produced, in the *peripheral* vascular system" (italics not in original).

Interest in the cerebrospinal fluid was likewise increased during the 1914–18 war and the initiation of the modern phase was in large measure due to your countryman, Lewis H. Weed. If knowledge is as yet incomplete, for the cerebrospinal fluid story is still to some extent mysterious, at all events it is far greater and more satisfying than it was three decades ago, when I was a student. Incidentally, I think some tribute should be paid to Harvey Cushing for his observations upon the production of cerebrospinal fluid in human patients during operations.

The blood volume and blood depôts are the third section I mentioned. The state of knowledge about the amount of blood in man and various animals was well summarized by your Joseph Erlanger in *Physiol. Rev.*, 1921, **1**, and it is worth mentioning that that article is not without value today. Alterations in blood volume were already thought of at that time as occurring in various conditions[8] and there had for some time been estimates of the differential distribution of blood, under various circumstances, in a number of sites in the body[9]. It was, however, Joseph Barcroft who effectively introduced the concept of "blood-stores" or "blood-depôts" and in consequence that of an infinitely variable circulating blood volume, reduced to a minimum (with attendant economy) in the body at rest and rising to a maximum with increases in the body's activity. I need not recall to you at length how he found variations in blood volume with changes in the environmental temperature during his travel to the Andes in 1921–2. He suspected the spleen's activity as a factor, and on his return he did experimental work which showed that in various animals that organ did act, to a varying degree, as an unconditional blood depôt. Recent studies, however, have queried the importance of the spleen in the human subject

[7] In respect of respiration, Barcroft long ago stated the need for this re-orientation of outlook (see Barcroft, 1914, Part II).

[8] *E.g.*, I remember Prof. Georges Dreyer discussing them in relation to altitude.

[9] See, *e.g.*, R. M. Wilson's little-known book, *The hearts of man*, 1918.

even if it can hold up to 20 p.c. of the total blood in the dog. I think that, in this instance, we have to thank Barcroft and others for underlining the great variability of the blood volume; on the other hand, we should, I think, regard the suggested conditional blood depôts (portal system, hepatic venous system (in the dog only), subpapillary venous plexus of the skin, quiescent lung vascular system, uterine veins of pregnancy, and the larger veins) merely as affording special examples of the capacity of the body for varying the differential distribution of the blood volume. We should, in other words, learn all we can about individual parts mainly to integrate that detailed knowledge into our picture of the blood circulation as a whole.

The fourth section of the cardiovascular system which I mentioned was the venous system, the study of which was greatly advanced by Fleisch and by Gollwitzer-Meier in the late twenties and early thirties. As a result of their work and of that of others, there is greater, though as yet still inadequate, appreciation of the activity of the system and of the important part which it plays in the circulation. The blood-depôts are, almost all, parts of the venous system and through their and the veins' activity, regulated by the nervous system and various chemical substances, the venous return and thereby the output of the heart is controlled. The healthy heart is competent to forward all the blood which the veins bring back to it, and its activity must be regarded as dictated by that return.

With regard to the lymphatics, I think it would be right to say that much experimental work has been done in the last three decades, but that many of the earlier conclusions were based upon studies in which experimental conditions were not beyond criticism. It seems to me that we are now accumulating, more laboriously, more correct knowledge about the activity in this notoriously difficult terrain. To illustrate how hard it is of approach, I need only quote C. L. Prosser's statement that the total lymph volume is unknown in any animal.

About the tissue fluid and about its circulation we were, until recently, even more ignorant. I remember as a student hearing the words "tissue fluid" mentioned, but I tried thereafter unavailingly for many years to get quantitative data about its amount, composition, pressure, distribution, and circulation.

About the filtration rate of the kidneys again, until comparatively recently, we were without accurate knowledge, and similarly about most other special extravascular and extracellular movements of fluids.

About the circulation of fluid and dissolved substances within the body cells themselves our knowledge was virtually nil.

We see, from the above review, that the blood circulation had progressively and ever more rapidly become, since its discovery by Harvey, the dominant part of the total fluid movement picture, mainly because, I think, it was technically the most easy to study. Within the blood circulation the supposedly dominant, and certainly the most spectacular, part played by the heart was given undue prominence until recent times when it became realized that the heart had its activity dictated by the venous return, and that the latter was essentially bound up with the activities of the tissue cells themselves. I have personally reorientated my teaching of circulatory physiology for many years past, and have begun at the periphery with the venous end of the capillaries and with the post-capillary venules. It is less exciting, for beginning students, than dealing first with the heart, but it is right, and I am glad to see that in the latest edition of a major textbook, Fulton's continuation of Howell's physiology, my friend, Dr. D. H. Barron, has conceded the same truth. We can now pass to the last section of this lecture.

4. The introduction of modern biochemical methods restored the balance. Biochemistry, in the English-speaking countries, is a comparatively recent daughter-cell of physiology, biophysics—where it has separated off—even more so. In the British Isles the first chair—a research one—of biochemistry was founded in Liverpool, and its first occupant, about 1902, was Benjamin Moore. The first regular chair

was the Cambridge one, occupied in 1914 by Gowland Hopkins. The second one was the Oxford one, to which Benjamin Moore came at the beginning of 1921, when I was a student in the Final Honour School of Animal Physiology. I have since often tried, without much success, to get from Professors of Biochemistry and of Biophysics precise definitions of their sciences, and I must therefore attempt my own. I would say that the main objectives of these offsprings of physiology are the unravelling of the processes occurring within the body cells themselves, and that all other objectives are incidental, within the sciences named, to this major one. Alternatively, one could say that biochemistry and biophysics take over where the instruments and methods of experimental physiology become too crude for detailed investigation, and the range of human vision, even with the aid of microscopy, becomes inadequate for observational physiology (but see below). Obviously, the biochemist and biophysicist are doing things both fundamental and exciting, though not directly spectacular in the way that ordinary physiological experimentation can be. Now the latter has not exhausted its usefulness, and doubtless there are many triumphs yet in store for it, but the more or less virgin field which the functioning cardiovascular system presented at the beginning of the nineteenth century has had many of its more general aspects qualitatively explored, and the more detailed modern investigations cannot be expected to produce a thrilling result each day or each week, which—if one exaggerates a little—seems in retrospect to have occurred in Carl Ludwig's physiologische Anstalt zu Leipzig in the seventies and eighties.

The biochemists, however, have for some time past been working in previously unexplored fields, and have developed techniques that are on the whole less traumatic, as well as speedier and less equivocal, than those of experimental physiology. In addition, the tissue cells seem capable of supplying problems for solution for an indefinite period.

The biochemists have already added to the full circulatory story in a variety of ways, including:

(1) Determinations of the total extracellular space, from which—in animals with a closed circulation—the blood volume can be subtracted to give an indication of the amount of tissue fluid. The extracellular space has been found, by the use of such substances as thiocyanate and radioactive sodium, which are taken up very sparingly by tissue cells, to be from 20 to 30 per cent. of the body weight;

(2) Better techniques for the estimation of blood volume;

(3) Techniques for the estimation of renal blood flow, glomerular filtration rate, etc. The story of these is so well known that I need not summarize it here, and need only state that the advances were mainly the work of Americans;

(4) Tracer and other techniques leading to knowledge of the rapidity and amount of the fluid circulation through the tissue spaces, and into and out of the tissue cells. An important date here was 1923, when Hevesy (*Fig.* 1) initiated the use of isotopes in biological studies. Wormall, in a review published the year before last, wrote as follows: "When Hevesy, in 1923, first used a radio-active isotope to study the transport of lead in plants, I wonder if he or anyone else could visualise the tremendous developments which would later take place in this field of work. In those early days the choice of radioactive isotope was limited to those which occur naturally, such as those of radium, and it was not until artificial radioactivity had been discovered by the Joliot-Curies in 1933 that the great potentialities of radio-isotopes as tracers began to be realised. In this renewed attack starting about 1935, Hevesy was again in the forefront, and soon he was joined by dozens and later thousands of other scientists who had an urge to use these new weapons".

Hevesy himself, in his review (1948), said that he had had to restrict himself to the discussion of a fraction only of all the impressive work carried out with isotopic indicators, but

that possibly the most important result has been the discovery of the dynamic nature of the body constituents—we recall the title of Schoenheimer's book, which first set me thinking along the lines of the present lecture, namely, "The dynamic state of body constituents."

biochemists for the revolution which they have already effected in our knowledge of, and ideas about, the extravascular circulation.

To put some of the findings quantitatively, I will quote from a review, as yet unpublished, by one of my Lecturers, Miss E. A. Ullmann. Even under relatively basal conditions, she

Fig. 1. Professor G. Hevesy, who in 1923 initiated the use of isotopes in biological studies.

Now I am not a biochemist. Indeed, I have often said that my epitaph should state, as the most remarkable event in my scientific life, "He was once offered a demonstratorship in biochemistry" (somewhat like the lawyer whose surname was "Strange", and who said that all that should be put on his tombstone should be, "Here lies a lawyer and an honest man." Everyone who saw it, he forecast, would immediately say, "That's strange"). I wish, however, as a physiologist interested primarily in the circulation, to pay my tribute to the

stated, the heart output per day is 8–9,000 l., of which about 5000 l. is plasma. The water leaving vascular for extravascular regions over the same period is of the same order, namely, over 7000 l. per day. Against this vast amount, what earlier seemed amazing renal figures, namely, a daily glomerular filtration of 180 l., with reabsorption of 178.5 l., fall into their proper perspective, and the daily production of digestive secretions, 8 l., and water loss through all channels, ± 2.5 l., seem minute. Nor is the thoracic duct lymph flow, directly

measured in a patient with a gunshot fistula, very great: it was of the order of 3 l. per day in the woman in question[10].

In general, then, we see that the extravascular circulation of fluid is so great and so rapid that we must cease considering the blood circulation as a separate entity, and integrate our knowledge of it with this other knowledge which has accrued so rapidly as the result, in the main, of the researches of biochemists.

Because of this new knowledge, the extravascular fluid movement, so dimly apprehended by Galen eighteen centuries ago but retained as a feature in the total physiological picture despite its progressive overshadowing, from Harvey's time on, by increase in knowledge of the functioning cardiovascular system—the extravascular fluid movement, I say, has come into its own and the lack of balance has been eliminated.

I have stated that we owe the change mainly to biochemists. I should, however, mention the fascinating work which is being done at Galveston, Texas, by Charles Pomerat and his human tissue culture group. For they are adding materially, and dynamically (since their records are microcinematographic films), to our knowledge of the circulation of tissue fluid, and of the movement of fluid into, and out of, cells. They consider that the neuroglia cells, with their actively moving membranes, may promote extracellular fluid circulation in the central nervous system. They have also seen cells of various sorts, by means of such membranes, enclose fluid within their bodies, with subsequent expulsion of water from the same. This phagocytosis of water and solutes means that a cell may take in, within a short space of time, several times its own weight of water, and we may recall Warren Lewis' term "pinocytosis." Here then, in tissue cultures at least, is visual confirmation of part of the biochemists' story.

From a writer earlier than Galen we can quote the phrase πάντα ῥεῖ οὐδὲν μένει—everything is in a constant state of flux, nothing remains static. That is true both of our circulatory physiology and also of our total fluid circulations. So much so in respect of the latter that the component parts of the individual tissue cells change from minute to minute.

In conclusion I will project a short indirect cineradiographic film, made by Professor W. Böhme in Rostock before the war and showing the passage of contrast blood through the heart and great vessels of a cat. Had I a copy of Professor Pomerat's film showing phagocytosis of water, I could fittingly project that after the other one in support of my general thesis. Professor Böhme's film, however, may by itself do something to eradicate a fault that must otherwise attach to any spoken account of the circulation. For the only real way of presenting such a moving process is by means of moving pictures—mere words are an altogether inadequate medium for conveying an impression of so dynamic an activity.

[10] Courtice *et al.* (1951) reported a flow of 65 ml. per hour, or 1.6 l. per day.

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Memoir of Brooke Melancthon Anspach (1875–1951)*

By LEWIS C. SCHEFFEY

ONE of the many gracious remarks that live in the memory of those who admired and loved Brooke Anspach was that of a Jefferson colleague who once said of him "he is the gentleman of the Faculty." These words characterize the physician whose memory we are privileged to honor this evening. Two days ago, had he lived, Brooke Melancthon Anspach would have been 76 years of age, for he was born in Reading, Pennsylvania on March 3, 1876. At that time his father, the Reverend John Melancthon Anspach, D.D., was pastor of St. Matthew's Lutheran Church, second oldest church of that denomination in Reading. His mother was Lydia Catherine Bucher. The Anspach family was of German ancestry, and hanging on the walls of his office were several beautifully colored photographs of the quaint medieval town of Ansbach, in the Bavarian principality of that name.

The family moved from Reading to Easton, Pennsylvania in 1877 when the father was called to the pastorate of St. Paul's Lutheran Church in that city and there the son soon attended the public schools, graduating from Easton High School in 1892. Awarded a scholarship to Lafayette College, he remained there for one academic year, entering the Medical School of the University of Pennsylvania with the class of 1897. Forty years later, in 1936, Lafayette honored her distinguished son with the degree of Doctor of Science, on the anniversary of the graduation of the class that he had entered as a freshman. Among his classmates at the University were many whose achievements are a matter of record; none of them outranked him in accomplishment and prestige. Mention of Jesse H. Allen, Montgomery H. Biggs, George M. Coates, Jr., Walter G. Elmer, Charles A. Fife, Charles D. Hart, John C. Hirst, Thomas B. Holloway, William Pepper, Jr., Ross H. Skillern and Carl S. Williams, represent an illustrious group.

Doctor Anspach was chosen to be an interne at the University Hospital following graduation and he served until 1900 in this capacity. This was the turn of the century that was to witness striking progress in the science of medicine, for the Roentgen rays were soon to illuminate hidden pathology and the therapeutic virtues of radium were awaiting manifestation. The adoption of rubber gloves, caps and masks followed fast upon the epoch-making days of Pasteur, Lister and Lawson Tait. Howard A. Kelly, born in Camden and late of Philadelphia, fourth illustrious member of the founding Hopkins faculty of whom Osler, Welch and Halsted were the others, had established the precepts of modern American gynecology and was already sending forth teachers from his Baltimore workshop. Little wonder that the arrival of John G. Clark at the University in 1899 impressed this interne, the first to be assigned to the new Professor of Gynecology. That the impression was mutual was evidenced by Dr. Anspach's appointment to Dr. Clark's staff. In 1901 time was spent in Thomas Cullen's laboratory at Johns Hopkins, followed in 1902 by work with Ludwig Pick, premier gynecologic pathologist at the Landau Frauenklinik in Berlin. Returning from abroad, advancement was rapid, for he rose in the ranks to become Associate in Gynecology in the Faculty in 1910, and Assistant Gynecologist to the Hospital in 1914, relinquishing these positions in 1921, following his appointment that year to the Professorship of Gynecology at Jefferson

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Medical College and Attending Gynecologist to the Jefferson Hospital.

During his tenure at the University Dr. Anspach was a member of the John Morgan Society, and in 1917 was President of Alpha Chapter, Alpha Mu Pi Omega Medical Fraternity. He was closely associated professionally with very warm departmental friends, Dr. Charles C. Norris, Philip F. Williams, Everett P. Barnard, George W. Outerbridge and with the late Doctors Floyd E. Keene and William R. Nicholson. Likewise, Dr. Anspach served as Pathologist to the Kensington Hospital from 1902 to 1908, the institution founded by Howard Kelly soon after the latter's graduation from the University of Pennsylvania in 1882, and later to be presided over by the late Dr. Charles P. Noble. From 1914 to 1921, Dr. Anspach was Obstetrician and Gynecologist to Philadelphia General Hospital and to the Stetson Hospital, being associated with the Gynecean Hospital as well. Appointed Attending Gynecologist to the Bryn Mawr Hospital in 1915, this was the only position from which he did not resign when he went to Jefferson. He became Consulting Gynecologist at Bryn Mawr in 1932, continuing in this position until his death. He had a great affection for Bryn Mawr and for his associates there, and that this was reciprocated is evidenced by the memorial delivery room established to honor him there, long before he died.

From 1912–16, Dr. Anspach was Secretary of the newly-formed Section on Obstetrics, Gynecology and Abdominal Surgery of the American Medical Association and as its Chairman in 1917–18 his official address was entitled "Enterostomy and enterocolostomy in the treatment of acute intestinal obstruction following pelvic operations." It was during these years of World War I that he was enrolled in the Reserve Corps of the University of Pennsylvania, Base Hospital Number 20, and was likewise a member of the Volunteer Corps of Philadelphia which performed yeoman service during the influenza scourge of 1918.

Dr. Anspach became a Fellow of the College of Physicians in 1905, serving on the Council from 1935 to 1938. It was relatively early in his career that he was chosen to fellowship in the American Gynecological Society in 1909 at the age of 34. That he enjoyed the confidence, respect and admiration of his colleagues was evidenced by his election as Treasurer from 1916 to 1922, and by his deserved elevation to the Presidency, a premier honor, in 1935. The title selected for his Presidential address that year, "The contributions of Great Britain to gynecology and obstetrics," was a gracious gesture to Mr. Victor Bonney of London, the invited guest speaker for the meeting. Dr. and Mrs. Anspach were especially fond of the Bonneys, a regard that was mutual. They visited them in England, and kept up a frequent correspondence during and after the days of World War II.

He had also been chosen President of the Obstetrical Society of Philadelphia in 1925, and from 1924 to 1927 served as a Member of the Board of Governors of the American College of Surgeons. With the foundation of the American Board of Obstetrics and Gynecology in 1931, he was honored at once as a recognized Diplomate.

From his early days Doctor Anspach contributed wisely and authoritatively to gynecologic and obstetric literature, enhancing a reputation nurtured upon an intimacy with pathology, and associated with keen diagnostic perception, excellent judgment and meticulous surgery. He wrote for Martin's "Surgical Diagnosis," Hare's "Therapeutics" and "Modern Treatment," Wilson's "Internal Medicine" and for Kelly and Noble's "Gynecology and Abdominal Surgery." In later years he collaborated with the authors of Curtis' "Obstetrics and Gynecology." His outstanding literary achievement, however, was the textbook "Gynecology," published first by Lippincott in 1921. Favorable reaction to this work was international in scope, and four editions followed, the last one being a complete revision in 1934. Those of his associates who were privileged to assist Dr. Anspach with this work can

attest to the labor that went into it, for there was no compromise with mediocrity. Paragraphs were written and re-written to insure both accurate scholarship and facile expression. The original of every reference in an extensive bibliography was checked and titled completely. Only illness prevented the completion of a sixth edition.

As mentioned, Dr. Anspach became Professor of Gynecology at Jefferson in 1921, succeeding Dr. E. E. Montgomery, long the renowned incumbent of the chair. He brought to the college and hospital a zeal for service and organization soon manifested by his development of a staff of Jeffersonians, several of whom were inherited from his predecessor, for he brought no former associates with him. His manner of teaching was pleasing and methodical. He trained his assistants, internes and nursing personnel with thoroughness and understanding. He was not a "clock watcher" at the operating table; he cut no corners in the task at hand. He never spared himself in the care of patients, ward or private, and he was literally adored by them. No service was too minor for him to attend to himself, and by the same token, he expected of his associates a similar pattern of duty. His unquestioned intellectual honesty and courage of performance was outstanding. He never hesitated to speak straight from the shoulder, and while holding strong opinions he respected the ideas of others and endeavored to reconcile divergent views whenever possible. Hand in hand with his strong character went dignity, modesty, and graciousness. Small wonder that he inspired enduring loyalty in those attached to his service.

The class of 1938 at Jefferson honored Dr. Anspach by the presentation of his portrait to the College. This recognition by the student body of his devotion to their interests pleased him greatly. In 1940, at the age of 64, his resignation was reluctantly accepted by the Board of Trustees and by their action he became Professor Emeritus, continuing actively in private practice until illness finally intervened. Jefferson again distinguished him in 1946 with the honorary degree of Sc.D., at which time he presented the valedictory address to the graduates entitled "Life, Liberty and the Pursuit of Happiness." A year later he received a certificate in recognition of 50 years of service in medical practice, bestowed upon him by the Philadelphia County Medical Society of which he had long been a member; and, of course, he also belonged to the Medical Society of the State of Pennsylvania and to the American Medical Association.

During his life-time and even after his retirement from active teaching Dr. Anspach wrote numerous papers for presentation and publication but time and space do not permit of their complete recording here. An early one, "A study of the elastic tissue in the parous and the non-parous uterus" is worthy of comment because of its prime importance; also "The foundation of an endocrine clinic for the study and treatment of amenorrhea, uterine bleeding and sterility," which was incidental to the establishment of such a clinic at Jefferson during his professorship. Of more than passing interest, however, is that on February 4, 1915, he presented before the Obstetrical Society—here in this College,—a paper entitled "Experiences with radium in the treatment of carcinoma of the cervix," based on his initial use of the element in Philadelphia beginning in 1912, under the auspices of Dr. Clark's clinic at the University. Thirty years later, writing for the 25th anniversary edition of the *American Journal of Obstetrics and Gynecology*, he contributed for the December, 1945 issue his long-range viewpoint and rich experience in his final scientific paper entitled "A review of the problem of cancer of the cervix since the use of radium in 1912."

On November 1, 1906 Dr. Anspach married Martha Brown McCormick of Williamsport, Pa., whose father, Dr. Horace G. McCormick, was a Jefferson graduate in the class of 1874. Mrs. Anspach and their two daughters, Margaretta—Mrs. J. Kent Willing, Jr., and Catherine—Mrs. George L. Pew, together with five grandchildren and a sister, Miss Blanche Anspach, survived his death on July 8, 1951. Aside from his distinguished professional career, Dr.

Anspach had a satisfying home and social life, enjoyed with many friends of long standing. He was fond of rowing as a young man and was a member of the University Barge Club. Golf claimed his interest during his active life, and he was long a member of the Philadelphia Country Club. He liked to play poker with a group of kindred spirits, of whom Dr. Fielding O. Lewis was a member. He enjoyed travel, especially those jaunts with his colleagues of the American Gynecological Club. In his library, biographies were a satisfying hobby and he valued his membership in the Union League of Philadelphia.

He was a devout member of the Bryn Mawr Presbyterian Church throughout his long residence in Ardmore, and it was in this church that his good friend and former pastor, the Reverend Andrew Mutch comforted the family and friends of Brooke Anspach on that sunny afternoon when we gathered in tribute to a gentle soul departed.

Memoir of Charles James Hatfield*

By ESMOND R. LONG

DR. CHARLES JAMES HATFIELD, life-long worker in the campaign against tuberculosis, died in Philadelphia, August 25, 1951 at the age of 84 years.

Born in Philadelphia, January 23, 1867, son of Daniel K. and Margaret Alexander Hatfield of that city, he graduated from Princeton University in 1888 and acquired a Master of Arts degree there in 1891. For some years he taught English at the Hill School at Pottstown, earning money to gratify his cherished ambition to study medicine. In 1900 he took his M.D. degree at the University of Pennsylvania, and in 1901 and 1902 pursued graduate studies in Göttingen and Vienna.

Shortly after his return to America he commenced the work to which he was to devote the rest of his life. In the early years of the century an inspired crusader in Philadelphia, Dr. Lawrence Flick, was vigorously engaged in a campaign against tuberculosis. In 1894 Dr. Flick and the Rev. John Scully, S.J. had organized The Free Hospital for Poor Consumptives at White Haven, Pennsylvania. Dr. Flick later secured the support of the industrialist and philanthropist, Henry Phipps, a partner of Andrew Carnegie, for this enterprise, and collected a group of gifted young physicians for its staff. Dr. Hatfield was one of these. Later, still under the stimulation of Dr. Flick, Mr. Phipps founded a new and unique type of institution for the care of tuberculosis in Philadelphia. Dr. Flick was made the Director, and took with him his energetic White Haven staff.

The Henry Phipps Institute opened its doors on February 2, 1903, and on that day Dr. Hatfield wrote Number 1 of its present 75,000 clinical histories. For the next 48 years his life and that of the Henry Phipps Institute were intimately interwoven. He and Dr. Frank A. Craig, another member of the original staff, and now Director of the Clinic of the Institute, remained continuously in its service from the opening date.

In 1903, when the Phipps Institute commenced its work, plans were underway for the formation of the National Tuberculosis Association. This great organization, the development of which was largely stimulated by Dr. Flick, was founded in Atlantic City in 1904. Dr. Hatfield was one of the founders. From their inception, the National Association and the Henry Phipps Institute were closely associated. In each of them Dr. Hatfield held positions of responsibility and authority for the rest of his life.

Seven years after its founding the Henry Phipps Institute was presented to the University of Pennsylvania. Dr. Flick resigned in a conflict of strong personalities. After two years' trial and error, Dr. Hatfield, who had demonstrated unusual executive ability, was made Executive Director of the Institute. He held this position until 1935. He was then sixty-eight years of age and requested the University to appoint a younger Director, while he assumed the title of Associate Director. With the onset of World War II he again became Executive Director, returning to the position of Associate Director after the war and remaining in that position until his retirement in 1948.

Throughout these years he maintained an intimate association not only with the work of the National Tuberculosis Association but also with that of its Pennsylvania and Philadelphia affiliates. He served as Managing Director of the National Tuberculosis Association from 1914 to 1922 and Secretary of the Association from 1927 to 1948. In the interim he had been president of the Association (1924 to 1925). For his outstanding service to the Association and its work he was awarded the Trudeau Medal of the Association in 1927. During these years he developed not only much of the organizational structure of the National Tuber-

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culosis Association, but important special features of its work, such as its medical research program. He was President of the Pennsylvania Tuberculosis Society from 1907 to 1909 and always an active member. He was concerned in the founding of the Society's city affiliate, now known as the Philadelphia Tuberculosis and Health Association, and served as its President for 24 years (1923 to 1947).

During these years inevitably he became connected with other health and welfare activities in Philadelphia. He was at all times active in the affairs of the Community Chest of Philadelphia, and served as Chairman of the Health Department of the Council of Social Agencies from 1938 to 1945. He was a warm supporter of the work of the American Red Cross and served as Chairman of its Southeast Pennsylvania Chapter from 1919 to 1927. As a result of these activities he was one of the best known physicians in health and welfare work in Philadelphia, a revered and respected figure who strengthened every organization with which he was associated.

His activities in the cause of tuberculosis were not limited to his own country. He was one of a small, far-sighted group that organized the International Union against Tuberculosis at the end of World War I, which has met in eleven world capitals since that date, and which will hold its Twelfth Conference in Rio de Janeiro in 1952. He was principal delegate and speaker for the United States at the meeting of the Union in Lisbon in 1937.

For nearly a quarter of a century he was the leading spirit of an organization closely associated with the National Tuberculosis Association, the Potts Memorial Institute of Livingston, New York, an institution for the rehabilitation of patients who had recovered from tuberculosis. He was its President from 1926 to 1948.

As an alumnus and administrative officer, Dr. Hatfield maintained close relations with the University of Pennsylvania. For years he was Chairman of the University's Committee on Graduate Medical Education and Research. He was made a life trustee of the University in 1921.

Few physicians can look back upon a more productive career in national and community service, but he did not neglect home, family and other intimate ties during that long period. He married Louise M. Spear of Wawa, Pennsylvania in 1901. Their union terminated tragically in her early death in 1909. Their three children reside in Philadelphia today, James S. Hatfield, Mrs. Aims (Margaret Alexander Hatfield) McGuinness and Dr. Charles Alexander Hatfield of the staff of the Pennsylvania Hospital. Dr. Hatfield was little given to discussion of personal affairs and few knew how deeply he was affected by his loss. He had strong social inclinations, and enjoyed an active social life. He and Mrs. Hatfield had built a summer home in Keene Valley, New York, which was a gathering spot for the family and their friends all of his life. In this little community Dr. Hatfield helped preserve a living memory of Mrs. Hatfield, a small, but well equipped neighborhood house and hospital, of which she was one of the founders. To this he gave constant attention.

Dr. Hatfield was a strong and devoted church member. He belonged to the Presbyterian Church in Chestnut Hill, and was one of the most active promoters of the Keene Valley Congregational Church.

His was a powerful personality. He was formal and reserved in manner, insistent on the highest standards of performance, and uncompromising with whatever appeared to him to violate them. As the years went by he had little time and less inclination for the clinical work that had originally attracted him, and developed almost exclusively as an administrator. He was accurate in detail, but early in his career learned the important executive function of delegation of authority.

In summarizing his long life and contributions, first emphasis should be placed on the force he contributed to the antituberculosis movement in the United States and his own community. The city of Philadelphia is greatly indebted to him for the long and effective support he gave to the health and welfare agencies which form an important part of the life of this city.

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The Physician's Concern in the Problem of Over-Population*

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ON August 6, 1945, the world suddenly found itself in a new era. The other great ages of human cultural advance got their labels long after they had passed into history. The Old Stone Age gave way to the New Stone Age over several millennia, at different times in different places. Iron supplanted bronze by the same slow process of diffusion and cultural accretion. After the people who did the job had long turned to dust, the labels "Age of Stone," or of "Bronze," or of "Iron" became benchmarks in the vast panorama of history.

The leisurely pattern of change which marked these earlier ages has ended. We were introduced into the Atomic Age by an incandescent mushroom-shaped pillar of fire and a sacrificial pile of corpses that would have impressed Baal or Moloch. The power trapped in atomic nuclei seems more likely to blow the entire human species into Kingdom Come than it is to solve the problem of peace and plenty for all mankind. If this giant can be harnessed to turn the wheels of our factories or to warm the apartments of the skyscraper troglodytes of this urban era, then it will be something of a miracle. The atomic prospect terrifies us, and quite rightly.

It has been rumored that before the pilot test of atomic power at Almogordo in the New Mexican desert, some of the top physicists who had contrived this awful gadget addressed an urgent memorandum to the President, pointing out that the conscience of America would never be quite clean again unless a representative of the Japanese government were present at that curtain raiser of the Atomic Age. After he had told the Japanese war lords what he had seen, the blood of any future victims of atomic warfare would be on their heads rather than on ours.

Whether such a memo was ever sent I do not know. But immediately after Hiroshima the nuclear physicists whose genius had brought this monster into being did band themselves together in an organization whose purpose was to tell vividly and passionately the nature of the power they had created, and to urge plans for its control.

To carry this message they established the *Bulletin of the Atomic Scientists—A Magazine for Science and Public Affairs.* In the years since Hiroshima this unique journal has made the nature of atomic energy available to all

* Nathan Lewis Hatfield Lecture XXXVI, College of Physicians of Philadelphia, 6 February 1952.

who will take the trouble to read it. It has revealed the impact of this tremendous new force on individual human beings and on the social and political organizations of mankind. When one considers how smugly, and irritatingly, self-centered and ivory-towerish the nuclear physicists of a generation ago were, this sudden awakening to a sense of social responsibility is a significant and challenging development.

The impact of atomic power on the consciousness of those whose research and engineering skills released it has a special significance for you members of the tribe of Hippocrates. For you, too, are caught in the midst of a galloping technical revolution. You, too, are juggling new forces which may save or destroy the world. In less than a century these new powers have revolutionized the life-pattern of human beings. Though this age is now beginning its second century, its existence as a turning point in human progress has not been generally recognized. It does not yet have a name. Yet in the centuries to come historians may rate it more portentous than the atomic bomb as an arbiter of human destiny.

For the sake of this discussion let us call the revolution which the life sciences have initiated the Vital Age. It marks man's effective victory over the mass killers—endemic and epidemic—which throughout all history have decimated human populations.

Since the earliest times, that deep-seated instinct to survive as long as possible has led man to try to extend the span of his years on earth. In some of these efforts man has been astonishingly successful. The domestication of animals and plants and the development of agriculture are notable examples. By increasing and stabilizing the food supply, mankind added to the carrying capacity of the land—in terms of human population—and considerably lessened the danger of famine. The harnessing of fire for warmth and for cooking food reduced the danger of freezing to death and made the joys of the table a somewhat less dangerous venture. Man's improvisation for defense turned out to be two-edged. Spears, javelins, arrows, got more food, but they also got more enemies. Those who feel that war is a necessary safety-valve for population pressure argue that this was a fine thing. The rest of us are not so sure.

In his direct attacks on death, man was far less successful. Considerable empirical knowledge was gained about certain drugs which acted as specific cures for a few diseases. But little progress was made against the really big killers—the infectious and contagious diseases which struck haphazardly with epidemic force and which every year took a frightful toll of infants and children. Plagues swept whole continents.

In 1349, a quarter of the population of England died (1). Even as late as 1918–19, a total of 20 million people are estimated to have died in the influenza pandemic. That was the last great epidemic. Every year almost since we can remember has seen some great advance in death deferment. DDT, the sulfa drugs and the antibiotics have added greatly to the prospect of survival in every part of the world. Even global wars no longer cause a decline in numbers of people.

To get some idea of the gain in reproductive efficiency which has occurred since Pasteur, let us consider briefly what happened in our own country and relate this to what is happening today in other parts of the world. In seventeenth century colonial America the average woman bore about eight children (2). With considerable immigration, this impressive fecundity brought about an increase of over 3 per cent a year, more than doubling the population in each generation (2). All during the nineteenth century the population of the United States continued to grow rapidly in spite of a steady decline in the birth rate. But this was offset by a falling death rate, which plus immigration kept the rate of growth high. The birth rate reached an all-time low of about 16 per thousand in the depression years of the 1930's. It has since risen to over 25 (3).

The 1940 Census reported that the average woman of white American stock who had

reached an age of 45 in the preceding decade had borne 2.6 children (4). In spite of this remarkable decline in fertility, so efficient is reproduction today that our population is still growing faster than the world average. It is actually growing about half as fast today as it was two hundred years ago when women were having an average of eight children each.

At current death rates in the United States today, an average of 2.2 children per woman maintains a balance in numbers (5). If American women had eight children apiece, with current death rates, every decennial census would reveal that numbers had increased by half. Our present population of 155 million would grow to over 300 million by 1972; and to three-quarters of a billion by the year 2000. This increased efficiency in reproduction profoundly alters the kind of people, in terms of age and sex, of which human populations are composed today. As you are aware, this aspect of population change has a direct impact on the practice of medicine. The kind of diseases you doctors are called on to treat has greatly been altered by changing age-distribution. The average interval between birth and death has more than doubled in the United States since 1800. The proportion of females has steadily increased. The patient today is much older than he was a few generations ago. The most frequent causes of death are degenerative diseases of aging humans. As this form of death becomes increasingly more common, the question of how long it is humane to keep suffering oldsters alive will become an important social issue.

It is hard for us in this year 1952 to imagine life in earlier times, when often a third—sometimes a half—of the children born died before their first birthday. That pattern still exists in large areas of the earth. In India today, of 100 children born, only 20 reach adulthood (6). So high is India's birth rate that in spite of this gruesome mortality, the population increases. Though many million died of hunger and disease, India's population increased 83 million between 1920 and 1940. Present increase is even more rapid—over five million a year (7). Because of the high birth rate—it is estimated to be about 45 per thousand—a lowering of the death rate would result in a fantastic increase in population—if—and this is a very big if—if food could be provided to feed all these new mouths. To lower the death rate without providing means of sustenance means inevitable famine. During 1951 the port facilities of India were taxed to the limit to handle the wheat shipped from abroad. The opening up of new lands in very large reclamation projects is taking care of only about one-thirtieth of the annual increment in numbers.

Changing patterns of survival are creating social, political and economic stress and tension in many parts of the world. Explosive increases in population threaten world peace. Any program which attempts to give the people of the world the freedoms promised them in the charter of the United Nations must take account of this problem.

The persistence of traditional birth rates after death rates have declined by a half or more is resulting in a veritable explosion of people. Taking the planet as a whole, world population has grown at an accelerating rate for nearly three centuries. With each generation the rate of increase has speeded up (8). This trend still persists. The last doubling of world population took a century. The present rate of increase—about one per cent a year—means that, at compound interest, numbers will double again in about 70 years. In many parts of the world, the rate of increase is now twice the world rate.

Among countries doubling in 25 to 35 years are some already very heavily peopled lands: Japan, with 3,640 people per square mile of arable land; Ceylon, with 1,390 people per square mile of arable land; Egypt, with 2,083 people per square mile of arable land; and Latin America—in some places already grievously overcrowded (9).

The present population of the earth is nearly two and a half billion. Increase in numbers, net gain of births over deaths, amounts to

about 70 thousand every 24 hours (10). Each time any of you take a patient's pulse, remember that with every three beats of the human heart, there are two more human beings on this earth, needing food, raiment, housing and adequate medical attention which today is not available for a majority of the people who are even now scrabbling for a living on this overcrowded planet.

There is a real possibility that the rate of increase will tend to speed up rather than decline. It is astonishing how easy and how inexpensive it is to lower death rates by modern techniques. All that seems necessary in some areas is to move in with a few public health teams, to equip the people with flit guns, and to dust a bit of DDT by airplane. In Japan, about five cents of every Occupation welfare dollar was spent on public health. This was enough to drop the death rate of a country of 80 million from 29 in 1945 to 11.4 in 1949. It was enough to furnish the Japanese people with an appalling problem of how to feed an estimated 100 million by 1962, and 166 million by 1985 (11).

In Ceylon the same pattern has been established on a strictly grass-roots basis. Armed with flit guns, the people staged a blitz on malaria with notable success. Infant mortality dropped from 130 in 1945 to 92 in 1948. The death rate dropped from 20.3 in 1946 to 12.6 in 1950. The population is now doubling in about 25 years (9a). How will the 2,800 people per square mile of arable land, which this explosion portends by 1977, get a decent living from an island that is now under heavy pressure to feed half that number?

In recent years there has been a popular awakening that population pressure is a serious threat to peace and plenty for the people of the earth. Much of this discussion adds to confusion rather than clarifying important issues (12). A recent pronouncement is a case in point. This presents a preview of a book by the Chairman of the Council of the Food and Agriculture Organization of the United Nations (13). The author attempts to create the illusion that there is no population problem. He claims that present increases in numbers are due to rising birth rates, caused by widespread hunger. He also insists that only about a third of the best agricultural land in the world is now under cultivation. He sees no difficulty in feeding six billion people—though a billion are now hungry.

Obviously, this kind of thing does not add up. As physicians trained to look beyond the symptoms to the causes of disease, such pronouncements deserve your consideration. If the proposals made seem to invite further misery and hunger and to build up stress likely to cause future wars, you can hardly do less than to counsel a more sane and realistic approach to the problem.

There are numerous other ways in which changing patterns of survival impinge more directly on your daily duties as physicians. For there are qualitative aspects of this problem that profoundly influence the health and fitness of the children of tomorrow, of next year and of succeeding generations.

In the last fifty years the science of genetics has made remarkable progress in revealing the processes whereby the evolution of different forms of living creatures has come to pass during the billion years that life has existed on this earth. Darwin postulated that death selection (meaning a failure to survive to leave descendants) was a primary force in evolution. High birth rates and differential death rates favored the survival of well adapted organisms. The question of why living organisms showed inherent variability—and of how this variability was transmitted from one generation to the next was an enigma which Darwin did not resolve. The great contribution of genetics to evolution theory has been to reveal the process whereby variation occurs and is transmitted by heredity (14).

The basic source of variation in living creatures is found in the process of mutation, whereby the units of heredity—the genes located on the chromosomes—undergo permanent changes in their nature. The process of mutation has been extensively explored. For many generations a particular gene may

undergo no change whatever. Then an alteration in its structure occurs which changes the characteristics of the individuals inheriting this variant form. The mutant form of the gene then persists for a long series of cell divisions. Then another form occurs, and this in turn is permanent. These mutations are very rare events, and each gene has its characteristic rate of mutation. Mutation rates for human genes vary from about one mutation per 100,000 chromosomes for retinoblastoma to one mutation per 12,000 chromosomes for a hereditary defect of the white blood cells called the Pelgar anomaly (15).

It is indeed a paradox that the vast majority of these spontaneous changes in hereditary material of organisms are actually deleterious to those individuals who manifest the new variation. About 90 per cent of the changes are lethal in their effects. When the organism inherits the same lethal mutation from both parents the embryo is not able to survive. Other variants which do not actually kill the organism are less well adapted to the environment than was the original form. In this category we have the hereditary diseases which are transmitted from one generation to the next according to Mendel's law (16).

Only a very small proportion of these spontaneous mutations are advantageous. Evolution has been possible because the process of sexual reproduction affords a means for combining many rare favorable variations in one individual. The high death rates in the early age brackets of all organisms which exist under natural conditions constitute a selective process whereby the disadvantageous variations are eliminated from the heredity network of the species, and whereby the rare adaptive genes are perpetuated and multiplied.

Since the process of mutation goes on continuously, the effect of stopping this selective process means a steady build-up of morbid heredity. The deleterious mutations are no longer eliminated.

Any change in reproduction which has the effect of stopping the elimination of unadapted genes through differential survival must necessarily reduce the adaptive efficiency of any species so protected. Since mutation rates are not high, this loss of adaptiveness does not happen over night. But the process is relentless. This process is vividly illustrated in the case of practically all parasitic organisms. Parasites get most of the work of existence done for them by their hosts. Hence organs that in a free living form are essential to survival are no longer exposed to selective action of differential mortality. The result is that parasitic species almost universally show a remarkable reduction of most of the specialized organs which in free living creatures are highly developed (17).

The advanced de-specialization of the typical parasitic species takes a great many generations to achieve. But the principle of this deterioration of adaptiveness and fitness due to a suspension of selection does pose a long-term ethical problem of finding humane substitutes for the cruel but effective selective action that in the past has sculptured the human body.

Concerning this matter, Dr. H. J. Muller, Nobel Laureate in Genetics, recently had this to say:

"... Persons with an antipathy to practical applications of genetics in man, [have a] blindly optimistic faith in the omnipotence of artificially controlled environmental influences. Its fallacy is of the same kind as found in the view, put forward in kindred circles, that the Malthusian principle is entirely wrong because advances in physical and socio-economic techniques will in the future enable us always to increase our means of subsistence faster than our population can naturally multiply. In both cases the nature and the enormity of the situation have eluded comprehension. It is not realized that the procedure proposed is, in the long run, as effective as trying to push back the flowing waters of a river with one's bare hands.

"If the attempt were made to continue indefinitely to substitute a more remote equilibrium [for present equilibria], by ameliora-

tive practices, it would mean an ever greater heaping up of mutant genes. There would be no limit to this short of the complete loss of all of the genes or their degradation into utterly unrecognizable forms, differing chaotically from one individual of the population to another. Our descendants' natural biological organization would in fact have disintegrated and have been replaced by complete disorder. Their only connections with mankind would then be the historical one that we ourselves had after all been their ancestors and sponsors, and the fact that their once-human material was still used for the purpose of converting it, artificially, into some semblance of man. However, it would in the end be far easier and more sensible to manufacture a complete man *de novo*, out of appropriately chosen raw materials, than to try to refashion into human form those pitiful relics which remained. For all of them would differ inordinately from one another, and each would present a whole series of most intricate research problems, before the treatments suitable for its own unique set of vagaries could be decided upon (16)."

This, Muller went on to say, was a *reductio ad absurdum*. Long before this stage had been reached, we would expect civilizations to collapse, with a return to the cruel effective cleansing of natural selection. The question of the long-term effect of loss of adaptiveness and of building up adverse mutations does not have to be settled today, or next week, or next year. What has happened in the first century of the Vital Age is that by virtually eliminating pre-adult death mankind has, for the time being at least, suspended the process of evolutionary selection. The question whether birth selection is to be substituted for death selection is in the long term fully as important as any question posed by the atomic physicists.

If the question is evaded, we are in the ridiculous position of heading toward adopting as our racial ideal these amorphous blobs of uncoordinated protoplasm Dr. Muller forecasts as our descendants.

Medical men face this question of morbid mutant genes very intimately in their daily rounds. They have to make decisions not on the basis of long-term planning, but in the concrete situation of the patient and his family—as of today, and as of the next generation. These decisions pose the problem of preventing disease and suffering in a context of perplexity that earlier generations of physicians were spared. For the power to perpetuate morbid heredity puts time into the Hippocratic mandate. When and how is the suffering to be stopped? The suffering engendered by hereditary defects, both to individuals who themselves display them and to the descendants of those who transmit them can only be ignored by the ignorant, the sadist, and the cynic. Widespread hereditary defects offer a serious public health problem.

The problem of diabetes in terms of the patient, of his family and of the larger social units such as city and nation may serve as an illustration. In spite of insulin, diabetes remains a major health problem. It is generally agreed that a large majority of diabetics owe their plight to an hereditary deviation from normal metabolism. Not all individuals having a genetic potential for diabetes actually manifest the clinical disease. But all who have the genetic potential for diabetes are definitely in the diabetic zone.

Prior to the discovery of insulin any human population enjoying a particular balance of carbohydrates in its diet would be expected to be in genetic equilibrium. Increases in the frequency of the diabetic gene through mutation would be balanced by an increase in diabetic deaths—and a return to equilibrium. A change in diet might bring more potential diabetics into the diabetic group, having the effect of increasing the diabetic death rate and of bringing about a lowered frequency of the diabetic gene in the population.

The discovery of insulin has changed this situation by making possible the survival through the reproductive decades of more people with diabetic genotypes. With insulin, diabetic women often bear and rear several

children, which rarely occurred before Banting's discovery. Selection pressure against the diabetic gene has definitely been reduced.

Since all progeny of a diabetic woman necessarily carry at least one gene for diabetes, all progeny of parents both of whom have diabetes are necessarily potential diabetics (18).

To the extent that the return of diabetics to a normal life including reproduction tends to increase the frequency of diabetic genes in the population, this does pose an ethical problem which cannot be ignored. Some of my genetic colleagues insist the "cure" of diabetes by the use of insulin constitutes a complete refutation of this view. I find that many physicians do not agree with this easy escape from a grave responsibility. If a person is better off with a normal pancreas than with a defective pancreas plus insulin, then the physician's pledge to prevent disease and suffering seems to require that he must take effective steps to assure that his ministrations do not multiply the defective genes which are the root cause of the disease.

Dr. Sheldon Reed has recently presented evidence that in our culture the possessors of at least one serious hereditary defect have greatly outbred their relatives who are free from the defective gene (19). In a large family in which Huntington's chorea was transmitted as a dominant gene, the choreic individuals outbred their normal siblings nearly two to one. This is in effect a strong selection in favor of the choreic gene. Its frequency in succeeding generations will rapidly increase.

Fortunately, selective elimination in the genetic sense does not imply any limitation of the freedom of action of affected individuals except in terms of reproduction. Selection can be by birth as well as by death. An individual who is destined to transmit to all or to half of his or her progeny a morbid gene has every right to enjoy as good a life and as long a life as possible. That he has either the right or the privilege to transmit a grave defect to his descendants is another matter. That the responsibility in this matter as it affects the individual or the physician who advises him can be evaded by the pious hope that some future discovery of science will wipe out all hereditary defect is in my mind infantilism at its worst.

The temptation to pass the buck with regard to the long-term consequences of today's actions is nowhere better illustrated than in the controversy regarding the genetic dangers of X-rays.

The mutagenic powers of X-rays were discovered by Dr. H. J. Muller in 1925. X-ray dosages used for diagnosis and treatment have been shown to be unquestionably capable of causing mutations in the human germ plasm. Muller's insistence that exposure to any X-radiation of the genital tracts of persons under 50 constitutes a definite genetic hazard has been but little heeded. There is still a feeling among those not too well acquainted with the genetic evidence which tends to underestimate the amount of mutation produced in this manner. It has been demonstrated that very small dosages of X-rays, 20 *r* units or even less, are capable of producing mutations, and that the effect of repeated dosages is cumulative.[1] Five 20 *r* doses equal a 100 *r* dose as far as mutations are concerned. Any genetic defect produced by X-rays are potentially a part of the gene-pool of future generations. With the emergence of the Atomic Age, the possibility of heavy dosages of X-rays for large numbers of people presents a very serious problem. Again, there is a failure to appraise the danger in time as well as of the moment. The people of Hiroshima are having normal babies. That the geneticist could have predicted—and did predict. That these babies carry injured genes which will produce defects in later generations cannot be doubted.

In the light of these well established genetic facts the geneticist is disturbed by the widespread use of mutation-producing situations in medicine and industry, with dosage tolerances which ignore the danger of mutation. He is shocked to read in the "Handbook of Atomic Weapons for Medical Officers" pub-

[1] Muller (16) discusses this problem in detail, giving extensive references to the literature.

lished by the Department of the Army in June 1951:

"While the genetic effect of radiation perhaps has been over-emphasized in the non-technical papers, it is thought that the probability of producing a mutation with a single ionizing event does exist. Little is known of the actual effects to be expected in man, but it is estimated that about 600 *r* would be required to produce significant mutation rate changes, and the fact of survival of an individual indicates a probable absorption of less than 450 *r*."

In the light of the genetic realities these words seem a shocking cynicism to me. The implication that death may occur at 450 *r* units is perhaps an under-estimate, but the argument that the gene mutations will be found only—or mainly—in corpses is clear enough. A geneticist must protest such gruesome casuistry as a means of by-passing a matter of great ethical importance. For as little as 25 *r* units is known to be mutagenic to the mature gonads in Drosophila, and the gonads of humans appear to be equally susceptible. A single fluoroscopic screening delivers as much as 75 *r* units to the skin. Several such screenings could easily have a mutagenic effect on the gonads.

X-rays and atomic energy are here to stay. But they are a dangerous tool which man must use with caution, if the genetic future of humanity is to be conserved. Here again, the physician finds himself in the midst of controversy, with the question of responsibility to future generations very much to the fore. Muller's estimate that in a population of 100 million, 5 million genetic deaths and many more million genetic cripplings could be the harvest of careless use of X-rays cannot be evaded by make-believe. The harvest of delayed X-ray injury suffered by scores of physicians who pioneered this new diagnostic and therapeutic tool should not be forgotten.

I would not like to close this overhasty review of some of the challenges, the perplexities and the paradoxes of this emerging Vital Age on too pessimistic a note. What has happened since 1850 has been by human agency. The old resignation in the face of the inevitability of human disease and suffering has given way to a realization that the gruesome wastage of millions doomed to die before they had more than come into this world has rightly ceased to be considered a virtue. Because this revolution in life patterns was not accompanied by atomic fireworks, and because there were no sacrificial piles of human corpses, the long-range implications of the vital revolution were not understood even by those who were most busily engaged in bringing it about. That there were long-term dangers as well as benefits in utterly re-making man's pattern of survival was not recognized.

Things have happened so fast that it is not surprising that these require a wholly new morality in medicine, in laws and in customs concerned with human reproduction (20). It is no longer enough to ask, "Am I my brother's keeper?" Our stewardship today extends to our children and our children's children. What we do today determines whether they can have a decent life, or whether they will face misery and starvation. What we do today determines whether their bodies and minds will be sound or whether they will be affected with a veritable Pandora's box of increasing genetic defect. Our responsibility in time, and over future generations runs counter to some very ancient customs and some very deep-seated emotions. The thinking of our time regarding these matters is still guided by traditions which once were on the side of righteousness when the virtues of fertility were fundamental, when many were called to birth and few survived to leave any descendants. That day is ended. That few people even yet dare to look realistically at the price tag in this enthralling game of truth and consequences in which humankind has embarked is not surprising. But the price which will have to be paid in suffering and degradation and despair if we refuse to look is terrifying. Like the atomic scientists, the life scientists need to give much thought to how the Age they have gestated will affect man's fate on this earth.

In this critical moment of history, you physicians have a tremendous opportunity for service. In the hard school of experience you disciples of Hippocrates know that before a disease can be treated with any prospect of success, a correct diagnosis is essential. That famous almanac-writing first citizen of your city of Brotherly Love found that even in his day symptoms and causes were often confused. Said he: "There are thousands hacking at the branches of evil for one who digs at the roots." An effective diagnosis of the population crisis lies in the realm of vital arithmetic. The roots are in changing patterns of survival and ancient patterns of birth.

You physicians know at first hand what unbalanced reproduction does to individual families where the number of babies exceeds the ability of the parents to fend for them adequately and to give them a decent start in the world.

You physicians know what it means for a child to be born who is afflicted with an incurable hereditary disease, like hemophilia or muscular dystrophy. More than most of us, you have an opportunity to see how population pressures set the pattern of human fate. Yours is the great privilege and duty to advise those dreaming, hopeful, sometimes fearing, and amazingly courageous players in the great game of life, the Marys and Johns, the Georges and Graces, who make up the human breed.

As persons trained in diagnostic technique, as members of a profession pledged to alleviate human suffering, you more than most can speak with authority and conviction on the greatest issues of this new age which you have helped bring to birth.

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New Advances in the Pathology of Burns*

By ANDRÉ SIMONART, M.D.

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I TAKE it as a great honor to talk this evening before the College of Physicians of Philadelphia and I present to the College and to the Committee, and in particular to Dr. Kern and to Dr. Starr, my very best thanks.

You gave me the opportunity of coming back to the United States and to Philadelphia. I was indebted already to this city and to this College of Physicians because more than twenty years ago I spent here twelve peaceful and interesting months in the Pharmacology Department of the University of Pennsylvania, with Dr. A. N. Richards and his coworkers; and also because several times I had the privilege of consulting books in the excellent library of the College of Physicians of Philadelphia. So I have the feeling of being a little at home here, and also the feeling one gets when coming back into a friendly place after a long absence. Moreover, I have now the pleasant opportunity of being allowed to express to you my gratitude for all these things.

This lecture on burns will not cover the whole field, because the subject is altogether too large and too complicated. There is not one problem of burns but many problems. For twenty-five years we have been doing research work on some of them. We were not able to find a solution to most of these problems, but it is inevitable that we, like all the other people who have worked on a problem which is not yet solved, should have a general opinion not only about the small number of minor facts that we discovered ourselves, but also about the significance of other facts in the same field. The title of this lecture, therefore, could be as well: Presentation of a certain number of facts and concepts related to the vast problem of burns, as an attempt to simplify the question.

It should be pointed out also that in this lecture only the cause of death after burn and the troubles which appear after very severe burns will be examined.

Death after burn may be the result of systemic disorders specifically produced by the burn itself. Death also has occurred because of infection of the wound and also because of generalized infection. Unfortunately, the death of burned patients has to be ascribed sometimes to the application to the burn wound of therapeutic substances which produce a lethal intoxication, namely mercurochrome and tannic acid.

We are going to deal only with the first of these three causes of death: the systemic disorders specifically produced by the burn itself.

When heat comes in contact with the body, it is usually with the skin and very often with the skin only. When the heat comes in contact with living tissue, one must expect: 1) a direct destruction of the cells by denaturation of proteins by heat, and 2) a direct destruction of the blood circulating in that tissue by denaturation of the blood proteins and hemolysis of the blood red cells. This hemolysis begins indeed at 45°.

The first question which we will attempt to answer is: What is the extent of the destruction of blood elements during a severe burn? Several factors, of course, will have an influence upon the extent of the blood destruction; among these are the size of the area that is in contact with the source of heat, the temperature which is applied to the tissues, and the duration of the burn. It also must be no-

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ticed, in connection with this problem, that during a prolonged burn the blood vessels dilate in the burned area, carrying much more blood through the overheated tissues than in normal circumstances.

It is evident, therefore, that clinical burns will be very different from one another, and that only experiments on animals will allow comparable data. Let us take as an example the burn at 80° of a rabbit, on one-third to one-half of its body surface.

A direct measure of the total volume of red cells of such rabbits before and at various times after burning by the carbon monoxide method gives very low figures after burning.

From these data it may be concluded that after extensive burns a great number of red cells have disappeared from the circulation. Regularly in severe cases hemoglobin can be found in the plasma and in the urine. The direct destruction of red cells, with eventual loss of iron, must be at least one of the causes of the anemia which follows an extensive burn for weeks and sometimes months later.

It is, of course, unnecessary to insist upon the clinical indication for blood administration to burn patients. Clinical observations have given rise to the following practical measure: To give as much blood as necessary to keep the level of the hemoglobin above 85%.

A second problem in connection with the blood lesion is the very pronounced diminution of plasma proteins. Although little doubt exists that in severe and prolonged burns plasma proteins must be directly destroyed, the diminution of blood protein is mainly ascribed to the fluid that escapes in the burned tissues to form edema. This edema fluid contains indeed as many proteins as the blood plasma itself.

The period of extensive edema does not last very long; nevertheless, the plasma proteins remain low. This diminution must be accounted for, at least partly, by the destruction which took place during the burn.

A comparison of the diminution of plasma proteins when edema is allowed to develop with that when edema does not develop shows that important quantities of proteins disappear from the blood even when no edema could develop. This protein diminution seems to be due, at least partly, to the direct action of heat on plasma proteins.

Another factor which must be taken into consideration, when talking about protein loss, is the escape of fluid at the surface of the burn wound and, in the case of large surfaces, this protein loss must be important.

The logical and now classical treatment of the protein diminution in burn patients is the administration of large quantities of human plasma to maintain a level of 6% plasma proteins. The early skin grafting of the wound to stop the protein loss also is indicated.

The destruction and sometimes extensive destruction of red cells, with the massive escape of plasma fluid at the site of the burn, must necessarily diminish the blood volume, at least during the first day following an extensive burn.

A third problem in connection with the blood injury after burn is hemoconcentration, which may be considered as one of the typical symptoms after extensive burns.

The classical, and for some authors the only, explanation of this hemoconcentration is the loss of plasma fluid in the burned tissue. Bearing in mind the fact that quite a number of red cells have been directly destroyed by the heat and have disappeared rapidly from the circulation, one must admit that the hemoconcentration means much larger fluid loss than is indicated by the red cell count and that made it necessary to measure directly the blood volume and the red cell volume.

Although the majority of writers ascribe the concentration of the blood to the local fluid loss at the site of the burn, some facts do not allow admitting this explanation in all cases.

When the blood concentration is measured very soon after an extensive burn, an important concentration of blood is shown to have taken place immediately after the burn, when no appreciable edema has yet developed.

In the same experiments, usually, the blood concentration does not increase further in the following hours, during which hours extensive edema sets in. One or two days after the burn, the blood concentration has disappeared entirely and the edema is still quite developed. It is impossible in these cases to admit that blood concentration is the result of edema formation.

These observations strongly suggest that the burn itself has something to do with this concentration. This is confirmed by an experiment which demonstrated that each time the animal was burned on the same place hemoconcentration developed and no local edema appeared.

What could be the cause of this very rapid concentration? When animals are examined during and immediately after the burn, one can easily note that all the tissues become intensely red even during the burn. This is, of course, due to dilatation of the capillaries, which can be followed during the burn by ophthalmoscopic examination of the eye grounds. This phenomenon is particularly pronounced in the stomach and in the small intestine. The escape of fluid through the dilated capillaries in all parts of the body gives a possible explanation of the sudden blood concentration. It has been demonstrated indeed that an increased capillary permeability does exist after burn.

It seems logical to admit that from the very beginning severely burned patients have a hemoconcentration due to a sudden and general capillary dilatation and that this blood concentration will be maintained and even aggravated by the escape of plasma fluid in the burned tissues. It seems rather important to understand that immediately after an extensive burn the patient suffers a kind of circulatory collapse with poor circulation and oxygen need, and that the inevitable fluid loss in the burned area must be compensated as soon as possible to balance a further loss and also to restore the blood volume.

Clinical experience has shown that early administration of fluid and also of oxygen are hitherto the best methods of treating the patient during this period.

If we admit that a sudden and generalized capillary dilatation takes place after burn, a new problem is to elucidate the cause of this dilatation.

Extensive experimental work has been performed that allows us to exclude a resorption of histamine, as well as nervous reflexes in the central, the sympathetic and the parasympathetic nervous systems. The hypothesis must be made that during the burn a substance is liberated in the injured tissues which enters the circulation and causes general blood vessel dilatation and general blood fluid escape. If such a substance actually is liberated in the burned area, it also could explain perhaps the large local fluid escape in the burned area.

Some years ago an American scientist, working now in Philadelphia, Valy Menkin, demonstrated the presence in injured and inflamed tissues of a substance which he called leukotaxine, which has the property of causing a considerable dilatation of the capillaries with increase of their permeability and formation of local edema. The possible involvement of this substance in burns was demonstrated later by Cullumbine, who was able, by injecting leukotaxine under the skin of rabbits, to reproduce the local edema, the general blood concentration and other symptoms of burns, namely, a negative nitrogen balance.

These experiments of Cullumbine were undertaken to demonstrate that the local inflammation caused by subcutaneous injection of leukotaxine is able to reproduce systemic disorders similar to those seen after burns, and it is quite tempting to accept this hypothesis.

Although the liberation and the production of leukotaxine at the site of a burn is not yet clearly demonstrated, it was interesting to investigate whether leukotaxine preparations injected intravenously would produce capillary vasodilatation and blood concentration.

These experiments recently have been carried out and have shown that some leukotaxine preparations can produce both symptoms, so that it may actually be said that the resorption of a substance or of substances which are very likely produced in injured tissues may give rise to a general capillary vasodilatation and to blood concentration.

Therefore, the hypothesis that the sudden circulatory collapse after a burn is due to the resorption of substances liberated in the burned tissues becomes more likely. It is, however, not yet certain.

Whatever the cause of this sudden and generalized capillary vasodilatation might be, trial of the action of vasoconstrictors, to see whether it is possible to counteract this vasodilatation, was indicated. Among several investigated substances, the only one which so far in most cases has a definite influence in preventing and neutralizing the effects of the hypothetical vasodilator is pituitrine.

As has been demonstrated, the effects of pituitrine are quite evident in utilizing the vasodilatation and it is also quite active in preventing vasodilatation. Much more remarkable, however, is the attitude of the burned animal after an injection of pituitrine. Immediately after injection its depressed and suffering appearance changes. It becomes alert, running about and looking quite well.

Although pituitrine has been tried in burn patients without marked success, the striking results obtained in experimental work could perhaps lead to a reconsideration of the action of pituitrine in man in the very early stages after burn.

In the discussion of leukotaxine and the possibility of reproducing by subcutaneous injection of large doses of leukotaxine systemic disorders noticed after burns, the problem of the nitrogen negative balance may now be considered.

For fifty years the increased nitrogen loss has been confirmed again and again in burned patients and animals. This situation lasts many days and even weeks. It diminishes progressively, but usually lasts until the burned area is completely healed. It must be said first that what is meant here by nitrogen loss is a considerable increase of non-protein nitrogen in the blood and the urine, resulting in the finding of much more nitrogen in the urine than is made available by the actual alimentary nitrogen. In the blood of the burned dog, for example, a 400% urea increase has been observed. After extensive burn, daily loss of 30, 40, and 45 g. of non-protein nitrogen through the kidney of burn patients has been reported.

This enormous loss of nitrogen must find its explanation in the destruction of corresponding quantities of proteins. The calculation of the amount of destroyed proteins implied by such a nitrogen loss indicates quantities of 100, 200 and 300 g. of proteins which must be destroyed every day during quite a period of time.

On the other hand, it is well-known that severely burned patients diminish in weight and several observations have been published of patients having lost, after the burn, one-third of their body weight although their alimentation was about normal.

Attempts have been made, of course, to check the negative nitrogen balance by giving the patients an alimentary supplement of proteins. To restore the equilibrium between nitrogen intake and nitrogen loss, quantities of proteins amounting to 300 g. a day and 2000 g. a week have been necessary. So the problem we apparently are facing now is the following: Either the patient will destroy his own substance or he has to take huge amounts of protein each day. The United States Medical Research Council recommends, we know, that burn patients be given, according to the severity of the burn, 2, 3 and more g. of proteins daily per kg. of weight. Many physicians will admit the difficulty of administering these large amounts of protein to all patients, especially in the beginning of the treatment. The injection of human plasma in the first days will certainly replace part of the lost proteins,

but many clinicians do not feel that the beneficial results are the same when injecting plasma and when feeding proteins or hydrolysates, the latter method being the more favorable.

Let us now examine the problem of the significance of this protein loss. The first hypothesis made was the following one: The tissues and the blood denatured or destroyed by heat are metabolized and eliminated, contributing to the formation of great quantities of protein metabolites. This is very likely true, but can this account for the huge quantities of nitrogen that are lost?

Let us consider burns in which only the skin is involved, knowing that the human skin has an average weight of 4 kg., ranging from 3 to 5 kg. Suppose, then, a theoretical very severe case in which half the skin is entirely destroyed (a loss of 2 kg. of skin). Even if we accept that this would mean 400 g. of protein destroyed, it cannot explain an extra destruction of, let us say, 200 g. of proteins a day lasting many days.

If the direct destruction of tissues by heat cannot give a satisfactory explanation of the total nitrogen loss after burns, such a destruction must nevertheless be taken into consideration.

A second explanation of the negative nitrogen balance is the rebuilding of destroyed tissues at the cost of other tissues which destroy themselves, to make available the necessary amino acids for the reconstruction of the necessary proteins.

A certain number of amino acids cannot be synthesized in our body. Those amino acids are necessary for building up new proteins. The healing of the burned area necessitates an increased synthesis of proteins. The insufficiency of special amino acids to cover this demand leads to an autodestruction of the organism to recuperate the necessary amino acids.

This theory explains the loss of weight of burn patients and seems to be confirmed by the fact that the nitrogen loss continues as long as the burn wound is not cured, and also by the fact that feeding huge amounts of proteins does indeed balance the nitrogen loss.

A search for the responsible amino acid or amino acids, and an attempt to check the nitrogen loss by giving a large supplement of the particular amino acid or amino acids to prevent the loss of weight of the patient and very likely also to promote the healing of the burn wound was indicated. This is the story of methionine.

In an impressive series of experiments on burned rats, methionine appeared to be the amino acid, the only one the organism cannot synthesize, the one necessary for building up new proteins and the one which, when given as a dietary supplement, was able to check the nitrogen loss.

The situation of a burned organism was therefore compared to a chemical intoxication due to the lack of a peculiar substance, in this case methionine, and it was supposed that after severe burns the organism destroys its own proteins to make available sufficient amounts of methionine.

Unfortunately, these experiments could not be confirmed by others, nor later by the authors themselves, and the use of methionine in the treatment of extensive burns did not modify notably the evolution of the general symptoms.

The problem of the negative nitrogen balance in burn patients is not yet solved and seems to be rather more complicated, because it has been demonstrated that in other pathological conditions a negative nitrogen balance exists which cannot be explained so far: for instance, abnormal losses of nitrogen after severe hemorrhage and in dehydration have been described. Now, the destruction of great quantities of red blood cells in extensive burns has some points in common with a severe hemorrhage and the fluid escape out of the blood with blood concentration might have some point in common with dehydration. All this adds up to the possibility that the nitrogen negative balance of a burn patient might have several causes.

The fact, however, that a severely burned

patient loses so much weight, and the same is true for burned animals, makes it difficult to admit that there would not exist here another factor complicating the other known causes of nitrogen loss.

This leads us to inquire more deeply into the real problem of the cause of death after burns.

The hitherto examined disturbances caused by a burn—destruction of part of the blood, loss of large quantities of fluid and proteins, extensive nitrogen loss—might explain the rapid death after extensive burn. These disturbances, however, can be corrected by blood transfusion, injection of human plasma, administration of saline solutions and amino acids. All these measures will indeed markedly improve the patient or the burned animal in the very first days and perhaps save their lives during that period; but nevertheless, a certain number of patients will die later, and all of the animals with an adequate burn will die in spite of the treatment cited above.

There must be another cause of death, different from the troubles we have identified so far.

An excellent demonstration of that other factor, the existence of which was suspected for many years, was given in experiments in your country which showed that a series of rats which had been burned so as to give nearly 50 per cent mortality were all saved when receiving large quantities of blood of normal rats, but died if the injected blood came from burned animals. These experiments suggest that in normal blood there exists a substance protecting the burned animal against a kind of intoxication.

A second demonstration was made on burned frogs. When the hind legs of frogs are burned, they will die two or three days later with characteristic symptoms very much resembling those of burned mammals, but if the burned limbs are ligated one or two hours after the burn, the frogs do not die. If after one or two days the ligatures are removed for at least twenty-four hours, the frogs die, and always with the same symptomatology.

The hypothesis made after these and other experiments is that the burned tissues liberate substances which intoxicate the rest of the organisms. For a long time many clinicians have admitted that such is actually the case, and the tannic acid and other methods of precipitating the burned tissues to prevent toxin resorption demonstrate that many people were and are convinced of the reality of a resorption of poison. The term "toxemia" of burn patients indeed derives from this concept.

Although more and more facts point to existence of a sort of autointoxication following a burn, the nature and the mode of formation of the toxic substances is not yet known. More than twenty different substances have been incriminated, but it never was possible to demonstrate that one of them was actually the cause of death or was formed in burned tissues.

Some facts have been discovered lately which throw a new light on that problem.

Having in mind the fact that a rabbit which is severely burned at 75° does not die and that the same burn at 80° always kills the animal, blood plasma of rabbits was heated at various temperatures and it appeared that, when heated above 75°, plasma becomes toxic and elicits in the injected frog symptoms which recall the systemic symptoms shown by that animal after burn. The injection of normal rabbit serum seems to be harmless in much larger doses.

The main symptoms shown by the frogs injected with heated plasma or serum are: general edema, congestion of various organs, mainly of the gastrointestinal tract, petechiae in many organs, including the muscles, and bleeding; even macroscopic bleeding was found.

The plasma or serum of other animals, the ox, horse, hog, and human serum gave entirely the same results.

Plasma and serum are, of course, very complicated fluids and it was necessary to study different parts of the plasma to know which of its constituents are responsible for the intoxication. Various fractions of plasma have

been isolated and heated at the same temperature and injected in frogs. These experiments have shown that all the investigated proteins of the plasma (serum albumin, gamma globulins, fraction IV_1 and fraction IV_4, fractions II and III together) when heated and injected in quantities equivalent to the total amount of proteins in the plasma, produce on the whole the same symptoms and kill the animals.

The conclusion may be accepted that heating the blood plasma above 75° will produce toxic substances which will more or less poison the organism and that the toxic material has its origin in the plasma proteins.

How many blood proteins must be overheated to cause a fatal intoxication in frogs? The toxicity of the proteins and the time required to kill the animals depends upon various factors: 1) upon the temperature, with a minimum of about 80° for rabbits' serum; 2) upon the pH of the protein solution when it was heated. The greatest toxicity was shown by proteins heated at pH 6.5. One might object here that this is not a physiological pH. It has been demonstrated, however, that a burn causes an immediate acidification of the tissues and of the blood, with a sharp fall in the alkaline reserve.

The following figure is the lowest which was obtained regularly: 0.3 mg. of heated serum albumin at 85° causes the death of 1 g. of frog.

If we dare transpose such a figure to the man with an average weight of 70 kg., that would mean that 21 g. of serum albumin heated at 85° would cause death. That would mean that 300 cc. of overheated plasma, that is, one-tenth of the whole of his plasma, would cause a lethal intoxication.

There are several reasons to believe that overheating the proteins of the tissues will give the same intoxication with a smaller amount, the cells containing much more protein than the plasma, usually twice or three times more. This would mean that one hundred to one hundred and fifty grams of overheated tissues would produce enough poison to kill a normal man.

If we consider again the weight and the surface of a normal skin, we would say that one square meter of the skin has an average weight of nearly 2.5 kg., so that 150 g. of skin would correspond to 600 square centimeters. No one will admit that the burn of such a small surface of the skin will kill a man. Fortunately, the burns are not so dangerous as that.

Speaking in clinical terms, we may admit that a burn of one-third of the skin is very dangerous for life. It depends, of course, on whether the depth of the burn involves the totality of the skin. Let us suppose that one-third of the skin is really overheated. That would mean nearly 1.35 kg. of skin containing nearly 20% of proteins. We may accept, then, that overheating one-third of the skin means overheating 270 g. of proteins. This is nearly 4 g. of overheated proteins per kg. of body weight. It means really more, because a quantity of blood, difficult to estimate, will be overheated together with the skin.

Let us now go back to our frogs and inject them with proteins which were heated at various pH's of physiological range, between 7 and 7.5. Consistently and regularly they are killed with 3 to 4 mg. per kg.

The first objection which can be raised against these experiments is that a frog is not a man and that a frog is not even a mammal, and that the reaction of both may be quite different. It must be recalled that, as was said above, the reactions of frogs to burns are very similar to those of mammals and of men; nevertheless, it was necessary to investigate the response of mammals to the injection of overheated proteins. This was done on rabbits.

The injection of overheated serum or of crystallized serum albumin, in doses of 3 g. of protein for one kg. of rabbit, caused the death of the animals. Although the symptoms of burns are not characteristic enough for us to identify with full certainty in an injected rabbit the same disturbances as in a burned

rabbit, it must be noticed that loss of weight, congestion of the gastrointestinal tract, and gastric ulcers were found in rabbits which died of the injection.

Two more considerations must be made in connection with these experiments. If, for a moment, we assume the best hypothesis, i.e., that we really did inject those healthy rabbits with the substance or the substances from which the burned rabbits died, we could not expect to obtain the same symptomatology in both. In the burned animal, the destruction of blood, the loss of proteins and of blood fluid, the reaction at the site of the burned tissues, the infection of the burned wound make for the time being a comparison impossible, and we must admit that we do not know whether we did reproduce in those healthy rabbits the eventual autointoxication of burns.

The second consideration, however, is the following one: If overheated proteins are really toxic, and they are; if they may cause death in quantities of about 3 g. per kg., and they do, how could a burned man avoid being poisoned by his own proteins which were overheated during the burn?

Further investigations have demonstrated that the proteins denatured by heat are not directly responsible as such for this intoxication but must be broken up in peptids to be toxic and that this proteolysis takes place in several tissues of the organism.

Practical Considerations in Aging*

By CLIVE M. McCAY, PH.D.

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AS ONE grows older and his comprehension of the interplay between the factors that govern human health increases, he appreciates the great difficulty of segregating any series of facts into one scientific cell. Such attempts can be made in discussing practical aspects of nutrition in aging but one must constantly remember that these discussions of food and nutrition are closely intertwined with economics, housing, family relationships, climate, religion, mental attitudes, exercise and many other factors.

Whatever the age or segment of the life cycle under consideration in feeding men or domestic animals one attempts to evaluate sources of knowledge and draw from the total that fraction which seems sufficiently established to be valid for current application. All that any of us can do is to make the best use of known knowledge. We all appreciate that this is seldom done.

At times one may become pessimistic in applying nutrition knowledge because he feels like the professor who told the college graduating class that about half of all they had learned was not true. He said, "The chief problem of the professor was that he was not sure which was the true half."

Likewise in application many of us are like the Maine farmer who listened patiently as the enthusiastic extension worker described better ways of farming. Finally the silent farmer said, "What's the use of learning any more new methods. I only do a fourth of the worth while things that I already know." As people grow older and become more rigid in their food habits they probably follow less and less the meagre nutritional knowledge they have acquired earlier. From our observations in some of the areas in which large numbers of retired people live we have become convinced that backwardness in using current knowledge of nutrition is characteristic of only a fraction of older people.

Thousands of older people have retired to new homes and new life in areas such as Florida. For the first time many, especially among the older men, have adequate time to think about food in relation to their welfare. Many are prepared to attempt new and better food habits in the interest of salvaging as much healthful living as possible from the few remaining years of borrowed time.

Unfortunately these older people in areas such as Florida fall into the hands of faddists who know little or nothing of modern nutrition. For this reason at the Gerontology Conference held in Gainesville, Florida last January we advocated that nutritionists in areas such as Florida pioneer in attempts not only to improve the food habits and nutrition of older people, but that these adult nutrition educators also work with the food faddists and help them acquire a body of sound knowledge. In the past we specialists in nutrition have devoted too much effort to condemning or laughing at the faddist and too little time in helping him acquire knowledge of the best we know. The history of nutrition teaches all of us that there have been times, not too infrequent, during the past century when the faddist was more nearly right in his beliefs and practices than the orthodox scientists.

If we wish to be practical in considering nutrition in relation to gerontology we need to weigh the validity of knowledge obtained from several sources, chiefly that acquired from centuries of human experience, that

* Read at the Joint Meeting of the College of Physicians of Philadelphia and the Philadelphia County Medical Society, in the latter's building, 14 May, 1952.

gained from a century and a half of designed studies with animals and finally that attained by studies upon man himself during the past two centuries.

In many fields the shadows of the past often carry a deadening influence repressing human action but in nutrition we too often forget the wisdom of the centuries and yield to the blandishments of the modern radio and television. We forget that we are not being given useful knowledge but are being sold some foodstuff or habit of nutrition that yields profits to some special industry.

Hundreds of books upon gerontology published during the past few centuries have given much attention to diet. Even the superb Bibliography of Gerontology edited by Nathan Shock must have missed at least half of the books concerning nutrition of old age and published prior to 1850. As an example we might cite the excellent work of John Sinclair, The Code of Health and Longevity. The sixth and last English edition of this excellent summary appeared in 1844, a hundred and eight years ago. This work itself contains a substantial bibliography of gerontology and dietetics for older people. The work of Sinclair is rich in older wisdom that has modern application such as the famous advice of Scarborough to the Dutchess of Portsmouth, "You must eat less, or use more exercise or take physic or be sick." If one consults Sinclair's section dealing with "costiveness" he discovers that our age uses the term "constipation" but we still offer the average person the same dietary advice concerning the consumption of more prunes, apples, cultured milks and breads made from whole cereals.

Today one of our largest life insurance companies is devoting much effort to teaching people to avoid obesity but this lesson has been the major one taught for nearly four centuries by Cornaro (1464–1566) in his famous work, the Art of Long Living.

We need to go back nearly fifty years if we seek the beginnings of modern knowledge, that partly starved mice were poor subjects for the transplanting and growth of tumors, since this was published by one of Ehrlich's students early in this century.

Without dwelling further upon our own weakness and fascination for the history of nutrition we can jump into the modern era. Like the Maine farmer however, it is evident to all that men know much more than they do, in using wisdom of the past in guiding nutritional practices of adult life.

For a few minutes it may be worth considering some aspects of modern nutritional research and the extent to which we are justified in daily application of current findings.

The maintenance of the skeletal structure affords a good example in which one can weigh the extent to which one can apply modern knowledge in practice. The deterioration of the skeleton in man and experimental animals has long been recognized as a characteristic of aging. In man this seems to start at about 45 years of age, in dogs at about six to eight years, in experimental white rats at the age of 15 months. Among these diverse species the deterioration of the skeleton seems closely related to the period of the last third of the span of life. In other words it seems associated with the sequence of events that we term aging and not related to time, in absolute units. Such age changes that require 45 years in man take place in the white rat or the Syrian hamster or the laboratory mouse in about 15 months.

Modern evidence indicates that the deterioration of the skeleton reflects the quality of the diet, changes in the endocrines such as the parathyroids and other factors such as exercise.

Unfortunately, the nutritionist usually steers a wide course around endocrinology. However, some of the clinicians do not do so and if one reads the excellent work of Albright and Reifenstein on *Parathyroid Glands* and *Metabolic Bone Diseases* he finds substantial evidence that human diets adequate in calcium tend to maintain the quality of bone even under adverse action of the parathyroids.

This affords some evidence that guides us toward diets adequate in calcium during

later years. One may then ask what constitutes a diet adequate in calcium and what factors condition this level as to its adequacy. The chemical balance studies of Roberts, Ohlson and others indicate that the daily need for the maintenance of the body in chemical balance is about a gram per day of calcium. This accords with the research findings of the past half century. Even on low calory diets ranging from 1337 to 2089 calories per day for women from 52 to 74 years of age, enough calcium could be ingested to maintain balance if the diet were liberal in milk or milk products. These investigators found that women selecting diets rich in sugar and starch or largely made up of baked goods tended to be in negative calcium balance.

The chief deficiency in human studies is that workers have not studied enough people for long enough periods when these individuals live under very diverse conditions. Thus our age is gradually coming to appreciate that exercise has a profound effect upon the calcium balance and that the dietary calcium need may be less if the body is subject to exercise. However, almost nothing is known about the reverse situation and abilities of the body to adapt itself to low calcium diets and little exercise.

This has been driven home to us very forcefully during these post war years. In the development of a special gruel-type diet for feeding the spastic feeble minded we have been using female patients in one of the wards of a state school. Among the two hundred odd patients is one older woman who is said to have been lying in bed as a state charge for about fifty years. Each time I see this patient I recall the experiment of Shorr, in which he found a group of medical students fed an adequate diet went into negative calcium balance while held inactive in bed for a few weeks. By contrast one sees this patient inactive for years and fed a diet quite low in calcium. It makes one appreciate the need for long time studies of the power of the animal body to adapt itself to adverse factors such as low calcium diets and lack of exercise. Such observations make us appreciate the weakness in generalizations based upon short time calcium balance studies upon small groups of active older women.

Animal research affords many opportunities to explore variables that cannot be readily studied in human beings. Such animal research indicates the more profitable directions toward which human studies can be turned. A brief review of some of our recent research with old animals in relation to maintenance of the skeletal structure may be worth while.

Three animal species are in current use in our laboratory for research upon old age, namely, the hamster, the white rat and the dog. Hamsters and rats are especially useful because they pass from birth to death in old age in a period of about two years. They eat essentially the same diets as man, have many of the same terminal diseases, and the same nutritional requirements, with a few exceptions.

A few of the differences between these two species may be pointed out. In middle life and old age the hamster seems much less subject to bronchiectasis than the white rat. The mean span of life for the hamster seems to be about three months longer than that of the rat, but our data are limited for the hamster. Furthermore, the male hamster seems to have a longer span of life than the female, which makes it different from other known species such as men, mice and rats.

Furthermore, the teeth of hamsters are more subject to decay from sugar than are those of rats, although the average white rat develops several decayed molars before it dies in old age. The hamster seems subject to a form of osteoarthritis. A brief description of this condition was reported by Ruth Silberberg and others from studies made upon hamsters from our colony, at the recent meetings of the Federated Societies. Thus the hamster promises to be especially useful for those interested in either nutritional or drug therapy in the study of osteoarthritis.

The obvious value of the dog in old age research has been neglected. After the past war

we set up a new dog kennel in which we maintain a breeding stock of pure bred animals to provide young dogs and a colony of old dogs for research in gerontology. We have adopted the policy of accepting as a gift any registered dog that is eight years old. Without special effort it has been possible to maintain between ten and twenty old dogs in our kennel.

In order to study such factors as exercise in the maintenance of calcium balance we have devised an inexpensive exerciser with variable speed and angles so that one can have dogs running on varying slopes at varying rates. This exerciser will handle three Great Danes or more of smaller breeds.

While this study of exercise is just beginning, evidence thus far indicates a favorable effect upon the calcium balance.

Many dietary variables influence the balance of calcium. For the past decade use has been made of calcium balance studies to measure the loss of skeletal substance during aging. At intervals throughout the span of life, both rats and hamsters have been used in such research.

The results of these studies can be summarized briefly. The small rodents tend to go into negative calcium balance when about two thirds through life or about 15 months of age. After this time of life the diet must contain about 0.3 per cent of calcium or more to maintain equilibrium in this element. This is about 50% more than seems to be needed by most older people. Males tend to go into negative balance earlier than females. Previous dietary conditions such as level of calcium in the diet seem to affect the need during the later period of life. Thus a white rat maintained during the first half of life upon a modest intake of calcium seems to come into balance in later life using a lower dietary level.

The higher the level of fat in the diet the greater the need for dietary calcium in old age. Hard fats such as tallow tend to waste more calcium than soft ones such as butter.

At different stages of life the animal body seems able to adapt itself to different forms of calcium. During the first two months of life and during old age the presence of oxalate in the diet seems to render much calcium unavailable but during the whole of middle life the animal seems able to assimilate calcium very effectively even in the presence of oxalate.

During the post war years radio-active calcium 45 has been available for research. Use has been made of this element to study calcium metabolism in the rat and dog during various states of life. In the form of lactate this Ca45 seems readily absorbed at about the same rate by old and young animals. Absorption is already very marked one hour after feeding as judged by the level of Ca45 in the blood. The chief difference between young and old animals is that Ca45 tends to remain in the blood much longer in the case of the old. In old dogs such calcium is readily measured in the blood six days after it is fed. Such calcium disappears from the blood of the young dog in about 24 hours.

The use of Ca45 has led to new insight into the paths of excretion of calcium. It was formerly believed that it was absorbed from the upper areas of the small intestine and excreted back into the gut in the lower areas. We are now coming to question part of this knowledge and believe that the bile and saliva carry much of the calcium back into the gut with a substantial amount excreted through the urine.

On certain diets much more calcium passes through the kidneys and into the urine. This is true for diets rich in milk and may make us wonder what effect this increased passage of calcium from long continued use of milk diets may have upon the kidneys. The life span of rats is not shortened if they are fed nothing but milk supplemented with trace elements for the whole of life. Such milk-fed rats die in old age with teeth that show no decay and with bones that are somewhat stronger and denser than is the case for rats fed complex mixed diets.

Finally the use of radio-active Ca45 has driven home to us again the importance of the

"time bomb" effect in nutrition and aging. Over and over again studies with rats have indicated that the nutrition of the first half of life may have a profound influence on both the span of life and the terminal diseases.

The effect of Ca45 upon later life has come to be appreciated in studies that are still in progress. For several years rats have been fed varying amounts of Ca45 in order to determine if this substance may affect the diseases of old age. During the spring of 1951 groups of rats were fed four different levels of Ca45 for periods of 9 to 30 days. They were then kept in the colony for blood studies but all results were negative. About 7 months after the feeding of Ca45 the first bone tumors started appearing. These seem to develop very rapidly after they start. They have appeared in only one group of rats, namely those given the largest amount of radio-active calcium.

Most of this group of rats fed the higher level is now dead. Thus for the first time one sees the influence of the radio-active calcium appearing long after the feeding of the material.

This raises many questions such as the relation between the age of the animal at the time of feeding and the later development of the tumors. It also makes one ask again about the relative turnover of calcium in the bones. Since the tumors have appeared upon the femur, humerus and vertebrae it makes one remember that radio autographs, after feeding Ca45, have shown consistently, even in old animals, that more of the Ca45 is deposited in the vertebrae than in other bones of the body. One may ask why these tumors have not appeared in other bones such as the mandible. Perhaps they have and we have not discovered them since we are not specialized in this field. Perhaps specialists in bone tumors already have adequate theories to account for the development of tumors on some bones more commonly than on others.

Time does not allow the survey of basic science fields dealing with substances of nutritional importance other than calcium but if one did this today, he would come to certain conclusions as a guide to practical nutrition of the aged. We might set these goals as follows:

1. Keep the body thin on a modest diet adequate in protein, minerals and vitamins but low in calories contributed by sugar, purified cereals and fats.

2. Special attention needs to be devoted to insuring an adequate supply of assimilable calcium and protein for those in the latter half of life.

3. Since most of the eleven million older people must live upon modest incomes, practical diets must be economical and based upon inexpensive foodstuffs.

All of us are then faced with these practical aspects of food in later life. Over the years certain plans of action have been formulated.

The first of these concerns the improvement of basic foods that can be afforded with a modest budget. The most obvious of these is bread. For this reason during the past decade we have given much attention to the improvement of white bread. As nutritionists we would prefer to have people consume bread made partly from whole grains but since public tastes are oriented toward white breads we have given most attention to these. Therefore we have evolved the formula that has the highest possible nutritional value at a modest cost. The best bread we can make today contains 2% wheat germ, 6% high fat soy flour and 8% non fat milk solids. This bread has an excellent taste as well as high nutritive value. All information has been made available to the bakers concerning this bread as a public service without any charge or restrictions except that they have been asked to print the formula on each label and not to use certain types of advertising. The open formula label has been considered important so that the housewife knows not only the ingredients but the amount of each used in making her bread. In time we hope this open formula policy can be extended to many other food items such as cakes, doughnuts and sweet rolls.

Such bread and baked goods make available

to old and young more and better protein. Furthermore such baked goods provide milk-calcium at a modest cost. Bread made by the above formula costs about a cent per loaf more than the poorest bread that is commonly made. This bread was first developed for the mental hospitals of New York State, since these hospitals care for more than thirty thousand people over 65 years of age. This bread is now used in the school lunch program in many of the larger cities of New York.

In any plan of feeding older people it would seem obvious that one should decrease to a low level foods that provide only calories such as sugar, starch, cooking fats and alcohol. One should attempt to increase moderately priced foodstuffs that contribute protein, calcium and vitamins. Such foodstuffs are non fat milk solids, wheat germ, soy flour and dried yeast.

Any program of better foods requires leadership by those who are informed. American food industries such as the bakeries will follow if leadership points the way.

Random Notes from the Library

The Contribution Plan in the Changing Pattern

The modern scientific research library has become a very expensive instrument—so expensive that, in most cases, its continued support solely by a local non-profit professional organization is no longer possible. Widening of the base of financial support in such cases often results, paradoxically, in circumscribing some of the areas of the library's free services. On the other hand, any limitation of free service runs counter to our unique American concept of the relationship between the library and its public. This is the problem we are attempting to meet, in company with many another research library formerly supported entirely by a non-profit professional institution.

Our library has developed from the status of one maintained primarily by and for the Fellows of the College to that of one expected and anxious to serve the entire medical community. For the greater part of the present generation, full use of the library's services was widely extended on a free basis. Coincident with this widening of clientele, however, came the fantastic growth of literature in the field of medicine, and increasing costs of operation which have outstripped the ability of a non-profit institution to meet them on ancient terms. Like God, philanthropic foundations and commercial organizations tend to look more favorably on those with the initiative to do what they can to help themselves. The Fellows' current campaign for funds is evidence of such initiative. The library's Contribution Plan is another example.

Under the terms of this plan, the library is still open to the public for use of materials in the library without charge. There has been no limitation of accessibility whatever in this most important respect. Further, certain groups—such as undergraduate medical students, hospital internes and residents, the Fellows' assistants paid by them personally—still have free borrowing privileges. Those asked to contribute in exchange for these privileges, therefore, are individuals and organizations assumed to be in a position to render a reasonable amount of support to the services, with an attempt being made on the library's part to relate the amount of the contribution to the professional status of the contributor.

Although commercial organizations comprise one of the categories of contributing borrowers, free borrowing and photostat privileges are accorded non-profit and governmental agencies, of which there is a goodly number in the area making constant use of these services. A recent study of its policies and services made by the library of the New York Academy of Medicine reminds us of the dangers of such a free inter-library loan policy when it says, "If books were freely loaned to New York City libraries, there would be small grounds for anyone's becoming a Library Subscriber, since most persons could borrow through another library."

This sister institution, consequently, requires almost all nonprofit, as well as the commercial, libraries to become library subscribers, thereby broadening its support locally. How so apparently small a variation in policy from ours can effect the kinds of use made of the two libraries is evidenced by the Academy survey. Over three times as many readers visited the Academy as came to the College. Considering only the difference in size of the two cities, this might be viewed as a normal proportion; but one would expect it to be maintained also in other comparative figures. This is not the case, however, for a little less than twice as many volumes were taken out in New York as in Philadelphia, while the College actually shows almost twice as many inter-library loans. In this light, it would appear that the higher attendance in New

York represents not entirely the difference in size of population but partly a larger proportion of visitors lacking borrowing privileges. How many of these would not have been registered as Academy visitors, had they been affiliated with some library that could have borrowed for them, it is impossible, of course, to judge. There can be no doubt, however, that the Academy policy both brings in important financial support and helps to achieve its other objective—that of keeping the material where it can quickly be consulted by the greatest number.

The success of circulation policies will always lie in their applicability to local conditions, their capacity to provide maximum service to the greatest number. Measured against this ideal must be the library's responsibility to find sufficient financial support to meet, so far as possible, the demands of the present and to prepare for those of the future. It is also important for the library's public to understand its policies through knowledge of the considerations which led to their formation. This has been the reason for presenting this story in these pages.

Historical

Recent acquisitions:

The library records with pleasure the following gifts from the personal library of its longtime friend and onetime chairman, Dr. Burton Chance:

Hippocrates. Aphorismi, ex interp. J. Heurnii. Ingolstadt, 1680. (A rare edition, in Lilliputian format. Jan van Heurne, credited with having introduced the clinical method of teaching at Leyden, has been characterized as one of the best of the Hippocratic commentators. This little book clearly was designed to slip into even the smallest of student and professorial pockets.)

Taylor, "Chevalier" John. The history of the travels and adventures of the Chevalier John Taylor . . . written by himself. 2 vols. London, 1761–62. Also: a bound collection of papers on Taylor, by George Coats, extracted from the *Royal London Ophthalmic Hospital Reports*. (As will be recalled, Dr. Chance has studied extensively, and himself written papers on, the career of this celebrated 18th century quack oculist.)

Crighton-Browne, Sir James. Burns from a new point of view. London, undated. (A vindication of the character of the great Scottish poet by a fellow-countryman who was a pioneer neuropathologist and psychiatrist. This copy contains the author's presentation inscription to Dr. Chance.)

Coward, William. Ophthalmiatria. London, 1706. (Dr. Chance published, in 1935, a paper that gives us the principal known facts concerning this controversial figure, whose ophthalmological tract appears to be as vulnerable, from the scientific viewpoint, as it is rare.)

Dr. Jonathan E. Rhoads, a member of our Library Committee, made possible our acquisition of the following:

Laënnec, R.-T.-H. Traité de l'auscultation médiate . . . 4. éd., considérablement augmentée par M. Andral. Bruxelles, 1837. (Viets, in his study (1926–29) of the Laënnec editions, establishes nineteen distinct printings of the classic between 1819 and 1839, citing this as evidence of the great demand for the work. Three editions in French were published at Brussels, the present one, the third, being described as the fourth because it is a reprint of the fourth Paris edition—a reprint with a difference, however. The three volumes of the Paris edition are reduced here to one volume, with double-column pages in the manner of many of our larger modern texts. "The plates are beautifully reproduced, even more artistically than in the Andral [Paris] edition, where they seem to be woodcuts, and here they look almost like mezzotints." Whether or not this is the rarest of the Laënnec editions, as it has been called, it is a notable addition to our Laënnec archive, which includes, incidentally, a rare manuscript volume of Laënnec's medical lectures, as delivered, probably, in 1823.)

Dr. J. Monroe Thorington, who has materially enriched our historical collections on numerous earlier occasions, enabled us to acquire the following:

[*Hippocrates.*] In Hippocratis librum de vulneribus capitis commentarius brevis, ex I. Caes. Arantii . . . lectionibus collectus, per Claudium Porralium Lugdunensem. Lugduni, 1579. (This is the exceedingly rare first edition of Aranzio's lectures on Hippocrates' treatise on wounds of the head, as published during Aranzio's lifetime by his pupil Claude Porral. The place of publication of the earliest edition, 1580, that appears in the *Index-catalogue* seems to be incorrectly given as "Lugd. Bat." (i.e., Leyden) instead of Lugd. *pur* (i.e., Lyon), where this first edition, of which the 1580 was apparently merely a reprint by the same printer, was published. Aranzio, of Bologna, was one of the group of anatomists which brought Italy to the front rank in that subject in the 16th century; his name is still with us in the anatomical structures called bodies of Arantius and ventricle of Arantius. The library has one of his more notable works, that on the human fetus, but unfortunately not in an edition containing his other two, equally valuable, ones: the *Anatomicae observationes;* and the book *De tumoribus praeter naturam secundum locos affectus.*)

Letter from Sir William R. Gowers to Dr. John K. Mitchell. There is not much in the literature linking Sir William R. Gowers (1845–1915), prominent English neurologist, with his somewhat older American contemporary S. Weir Mitchell (1829–1914). From our point of view, uncommon interest is therefore attached to a holograph letter from Sir William to Mitchell's son John K., in which the former, rather noted for the literary style of his lectures, reveals that he had used as a model in the development of his own style Weir Mitchell's "Lectures on the Nervous Diseases of Women". The letter, a much valued recent gift from our Fellow Dr. Robert S. Bookhammer, follows:

50, Queen Anne St.,
Cavendish Square
London, W.
Ap 30

Dear Dr John Mitchel

You will be prepared before this for the absence of promptness in my replies to notes or acknowledgement of books & realise that this involves no imperfection in my estimate of their value.

This, indeed, "goes without saying", of necessity & obviousness in the case of such a book as "Fat & Blood" to which we all are more indebted than we know, & that is much.

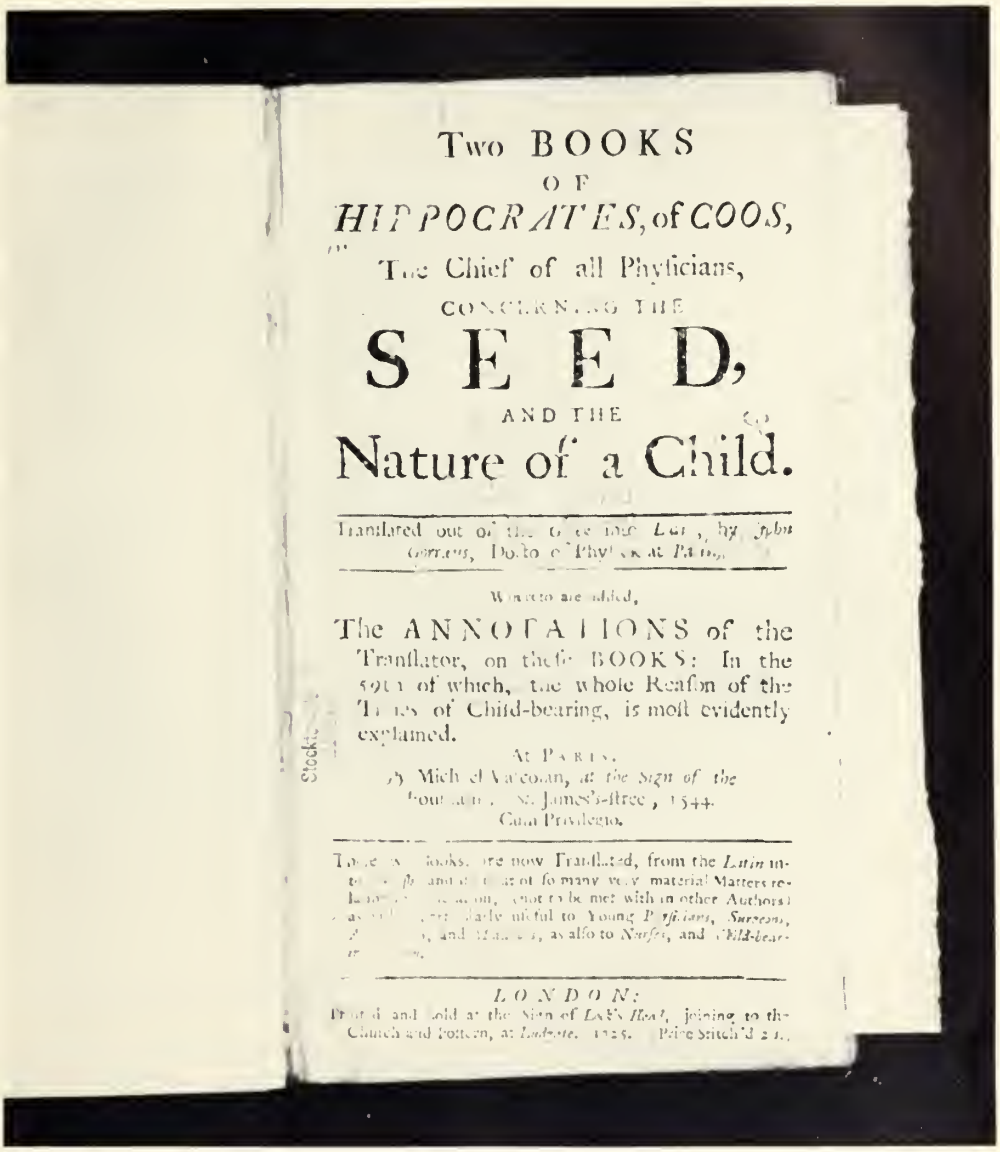
I put before this, in personal regard, the little book on Diseases of Women which appeared almost at the same time. I doubt whether a letter to your father was posted in which, a few years ago, I mentioned to him the remarkable service the style of this book was to me, in serving me as a model by which to frame my own style of medical description, so far as concerns its use for clinical lectures.

Sincerely yours
W. R. Gowers

I send a small reprint—unique in its way. In its object, if multiplicity compensates for minuteness, the total service will not be small, that owing to my notes of 3,000 cases, if all unknown.

This letter is undated, but may be dated with reasonable assurance—not, however, on the basis of the reference to Weir Mitchell's "Fat and Blood", first published in 1877 and subsequently reprinted many times; and to the "Lectures on the Diseases of Women", published in 1881, with a second edition in 1885. The postscript's "small reprint", with its "notes of 3,000 cases", would seem to point unmistakably to the year coinciding with, or one shortly following, the publication of the second edition (1901) of Gowers' "Epilepsy and Other Chronic Convulsive Disorders", which is based on a series of 3,000 of Gowers' own cases. Both auctorial convention and the octavo format sufficiently explain the use of the adjective "small" in reference to the 320-page book; while the word "reprint" is, of course, commonly used of post-original editions, though often incorrectly in a technical sense. Support is lent to this dating by the fact that, accompanying the letter, is a postcard (of relatively little

interest) from Gowers to J. K. Mitchell that is dated in July, 1902.



Two BOOKS
OF
HIPPOCRATES, of *COOS*,
The Chief of all Physicians,
CONCERNING THE
SEED,
AND THE
Nature of a Child.

Translated out of the Greek into Latin, by John Gorræus, Doctor of Physick at Paris.

Whereto are added,

The ANNOTATIONS of the Translator, on these BOOKS: In the 5th of which, the whole Reason of the Times of Child-bearing, is most evidently explained.

At PARIS,
By Michael Vascosan, *at the Sign of the Pourtcullis*, in St. James's-street, 1544.
Cum Privilegio.

These six books are now Translated, from the *Latin* into *English* and [illegible] of so many very material Matters relating [illegible], not to be met with in other Authors; as [illegible] clearly useful to Young *Physicians*, *Surgeons*, [illegible], and [illegible], as also to *Nurses*, and *Child-bearing Women*.

LONDON:
Printed and sold at the Sign of *Lyon's Head*, joining to the Church and Pottern, at *Ludgate*. 1725. Price Stitch'd 2 s.

Fig. 1

Hippocrates on intercourse and pregnancy. This is a saga of cataloguing enterprise—specifically, that of the library's cataloguer, Miss H. Muriel Hodge.

One of our American publishers who has done much to further the cause of medico-historical publication recently put us again in his debt by publishing an English translation of the Hippocratic treatises *On semen* and *On the development of the child*[1]. The state-

[1] Hippocrates on intercourse and pregnancy An English translation of *On semen* and *On the development of the child* by Tage U. H. Ellinger, with an introduction by Alan F. Guttmacher. N. Y., Schuman, 1952.

ment is made in the book—and consequently is carried over onto the book jacket—that this is the first time the two treatises have been presented in an English translation.

Now, our classification and shelving systems have many defects, but they do have the virtue of uniting on the shelves under one basic call number all the editions, including translations, of a given work. When, therefore, a new acquisition presents evidence that the work has been printed earlier, the cataloguer seeks in our catalogue for such printings, in order to give the newcomer the same basic call number that any older editions have. In the case of these Hippocratic treatises, there was every reason to suppose, of course, that we might have separate editions of them in the original Greek, in Latin, or in one of the modern languages—*English excepted*. With the attention thus focussed on non-English language versions of the two titles, the cataloguer *sans* extra-sensory perception would doubtless riffle on past a card leading off: "Two books of Hippocrates, of Coos, the chief of all physicians, concerning the seed, and the nature of a child" (*Fig. 1*). Our cataloguer, coming to the card, and having in mind that excellent scholars asserted that there was no earlier English translation of these treatises, indulged in what is popularly called a 'double-take'. It looked very much to her as though there had been an earlier translation after all. A few minutes of comparison established the fact that there had been.

This earlier translation came to the library in 1901 as an item in the J. Stockton-Hough collection, purchased for us by a group of Fellows of the College. Dr. Hough wrote in it, "The rarest of rare books, only copy I ever saw anywhere". That remarkable book-collector's estimate is so obviously near the truth that a brief description of the book is in order.

The anonymous English translation, published in London in 1725, was made from the Latin translation (*De genitura* and *De natura pueri*) by Johannes Gorraeus (Jean de Gorris, dean of the Paris Medical Faculty, 1548–9) first published in Paris, 1544. Fidelity to the original printing is maintained to the extent that, nearly two hundred years later, the Paris title-page, privilege, and dedication, are carried over in translation. The 138 pages (p. 138 is misnumbered 140) of text are distributed as follows: 1–9, "Hippocrates of the seed"; 10–38, "Hippocrates concerning the nature of a child"; 39–63, "Annotations of Dr. John Gorraeus, upon a little book of Hippocrates, concerning the seed"; 64–138 ("140"), "Annotations of Dr. John Gorraeus, on Hippocrates's book, of the nature of a child."

Hough's description of the book as "the rarest of rare books" has already been quoted. Let us add that his copy was bought for him at the auction sale of the library of Dr. William Kent Gilbert (a Fellow of this College), in 1881, by no less illustrious a bird of prey than Dr. John Shaw Billings—and for the munificent sum of $1.50. Indeed, there is pasted-in a "Memorandum" dated "Surg. Genl's Office—Washington, D. C. May 21, 1881" that, even at this late date, was momentarily disquieting, when it was ascertained that the title could not be found in the *Index-catalogue* of the Army Medical Library. For the memorandum reads: "It is understood that this book will be given to Dr. Billings, for the Library of the Surgeon General's Office, on payment of the cost price, provided he has not succeeded in obtaining a copy by the time he comes to print that part of the Catalogue containing Hippocrates."

There is added to the memorandum, however, a curiously worded note in Hough's hand: "Recalled by Dr. Billings. J. S-H." The Hippocrates volume of the *Index-catalogue* was printed in 1885. Another note by Hough indicates that he had the volume bound in 1887. It is clear, therefore, that, for some unknown reason, Billings annulled ("recalled") the agreement, voluntarily leaving the book in Hough's possession and our conscience untroubled.

Inasmuch as our modern translator had no knowledge of this 18th century translation, there may be some interest in seeing what

differences and what similarities are achieved by two scholars working independently, over two centuries apart, the one presumably from a Greek text, the other from a Latin translation of a Greek text. We give here, therefore, the respective translations of the opening sentences of the treatise *On semen*:

1725

All Things are effected by a certain Method. And doubtless the Seed of Man is a most powerful Excrement, that proceeds from the Juices of the whole Body. And that it is the most efficacious that is evacuated, is manifest by our becoming more feeble after Coition, by the Loss of so small a Quantity of it.

The Thing is Thus.

The Veins and the Nerves are extended from every Part of the Body to the Privities, which being stirred, warmed, and filled, an Itching is provoked, and a Delight and Warmth is diffused over the whole Body.

1952

Law governs everything. The man's semen comes from all the fluid that is in the body, being the separation of what is most potent. Here is an illustration in proof that it is a separation of the most potent part. The discharge of such a small quantity in intercourse makes us weak. This is the way of it. Veins and cords lead from every part of the body into the penis; when these are somewhat affected by friction and are heated and filled, a kind of tickling sensation sets in and consequently pleasure and warmth pervade the whole body.

If deductions from such small fragments were not absurd, one might postulate that, despite differences in basic texts, and in terminology, our 18th century and 20th century translators will be found on common ground, generally, in their interpretations of the essential meanings of a text stemming probably from the 5th century B.C. The more pronounced differences would seem to be not scientific but cultural ones, that now happily, now unhappily, separate nation from nation, century from century, father from son. Our library is fortunate, and grateful, to have both of these translations of an ancient text that contains, the modern scholars suggest, further evidence that old Helios, *anno 1952*, must seldom retire mentally exhausted from contemplating the day's truly original contributions to knowledge made by our proud and profligate race of man.

Transactions of the Sections

SECTION ON GENERAL MEDICINE

28 January 1952

Anuria following Therapy in Leukemia. A. M. Frumin*, M.D., and L. H. Beizer, M.D. (Discusser: Adolph J. Creskoff, M.D.) (*Abstract 1, below*)

Rickettsialpox: Report of Four Apparent Cases in Pennsylvania. A. C. LaBoccetta, M.D., Angelo M. Perri, M.D., Harold L. Israel, M.D., and M. M. Sigel*, PH.D. (Discusser: Hobart A. Reimann, M.D.) (*Abstract 2, below*)

Therapy of Ulcerative Colitis: Combined Treatment by Internist and Psychiatrist. Stanley H. Lorber, M.D., Harry Shay, M.D., and O. Eugene Baum*, M.D. (Discusser: Thomas E. Machella, M.D.) (*Abstract 3, below*)

A Clinical, Biochemical and Pathological Study of Hepatic Coma. S. C. Carfagno*, M.D., R. F. De Horatius*, M.D., C. M. Thompson*, M.D., and H. P. Schwarz*, M.D. (Discusser: John R. Neefe, M.D.) (*Abstract 4, below*)

25 February 1952

Eosinophilic Infiltration of the Gastrointestinal Tract: Case Report. Henry J. Tumen, M.D., George I. Blumstein, M.D., and Edwin M. Cohn*, M.D. (Discusser: Thomas E. Machella, M.D.) (*Abstract 5, below*)

The Use of Paritol C in the Treatment of Venous Thrombosis. Joseph B. Vander Veer, M.D., Elmer H. Funk*, M.D., and Frank R. Boyer*, M.D. (Discusser: Leandro M. Tocantins, M.D.) (*Abstract 6, below*)

Appraisal of a Fifteen-year Follow-up of BCG Vaccine. Joseph D. Aronson, M.D., and Charlotte F. Aronson*, A.B. (Discusser: William Weiss*, M.D.)

Indications for Intracranial Surgery in the Common Stroke: A Report of 29 Cases. Michael Scott, M.D. (Discusser: George D. Gammon, M.D.) (*Abstract 8, below*)

24 March 1952

The Interrelationship of the Endocrines and Carbohydrate Metabolism Based on a Case of Addison's Disease Developing in a Diabetic. Paul Todd Mackler*, M.D., E. K. Sifre*, M.D., and Joseph T. Beardwood, Jr., M.D. (Discusser: C. Robert Tittle, Jr.*, M.D.) (*Abstract 9, below*)

The Absence of Transfusion Reaction in a Patient with Granulocytic Leukemia Receiving ACTH and Cortisone. Ralph M. Myerson*, M.D., A. Henry Clagett, Jr., M.D. (Discusser: Lowell Erf, M.D.) (*Abstract 10, below*)

The Effects of ACTH and Cortisone on Patients with Chronic Hepatic Disease. W. Paul Havens, Jr., M.D., Ralph M. Myerson*, M.D., and Irvin N. Carroll*, M.D. (Discusser: John R. Neefe, M.D.) (*Abstract 11, below*)

A Two-year Experience with the Use of l-Hydrazinophthalazine (Ciba 5968 'Apresoline') in the Treatment of Essential Hypertension. M. August Lindauer, M.D., and Joseph H. Hafkenschiel, M.D. (Discusser: Milton L. McCall, M.D.) (*Abstract 12, below*)

28 April 1952

Miliary Tuberculosis of the Liver (Proved by Biopsy) with Recovery. Edward E. Holloway*, M.D. (Discusser: Harrison F. Flippin, M.D.)

The Splenic Flexure Syndrome Masquerading as Angina Pectoris. H. J. Dworken*, M.D., F. Biel*, M.D., and Thomas E. Machella, M.D. (Discusser: Samuel Bellet, M.D.)

A New Test for Vasopressor Substances in Hypertension. David B. Fishback*, M.D. (Discusser: Carl K. Friedland M.D.)

* By invitation.

An Epidemic of Dysentery. Hobart A. Reimann, M.D., and John R. Griffith*, M.D. (Discusser: Angelo M. Perri, M.D.)

SECTION ON MEDICAL HISTORY

24 January 1952

The History of Circulatory Research, Leading to a Wider View of the Circulation. Kenneth J. Franklin*, M.D. (*Printed in the Transactions & Studies* **20:** 23–33, *June, 1952.*)

28 February 1952

The Development of the British School of Dermatology. Joseph V. Klauder, M.D.

The Historical Background and Influences which Resulted in the Origin of a Unique Medico-Legal Organization: the Medical Diagnostic Clinic of the Municipal Court of Philadelphia. E. J. G. Beardsley, M.D.

27 March 1952

Smallpox Prevention Centuries before Jenner. Edward H. Hume*, M.D. (Discusser: Derk Bodde*, PH.D.)

The History of Pediatric Neurology. Abraham Levinson*, M.D. (Discussers: Frederick H. Leavitt, M.D., and John A. Rose*, M.D.)

17 April 1952

The Old Egyptian Medical Papyri. Chauncey D. Leake*, PH.D. (The Kate Hurd Mead Class of 1888 Fund of the Woman's Medical College of Pennsylvania Lecture in Medical History.)

SECTION ON OPHTHALMOLOGY[1]

17 January 1952

Some Phases of Keratoplasty. R. Townley Paton*, M.D. (Discusser: Harold G. Scheie, M.D.)

[1] Abstracts of the presentations at this Section customarily appear in the *American Journal of Ophthalmology* and the *A. M. A. Archives of Ophthalmology.*

22 February 1952

Regression of Metastatic Lesions of Breast Carcinoma following Sterilization: Case Reports. Richard A. Ellis*, M.D., and Harold G. Scheie, M.D.

Retinal Arteriolar Signs of Hypertension. Glen G. Gibson, M.D.

Mechanism of the Miotic Resistant Pupil with Increased Intra-ocular Pressure; an Experimental Study. George Tyner*, M.D., and Harold G. Scheie, M.D.

20 March 1952

Exophthalmos Associated with Disturbances in the Pituitary-Thyroid Axis. *Experimental Considerations:* William McKay Jeffries*, M.D.; *The Clinical Problem:* Edward Rose, M.D.; *The Neuro-surgical Problem:* Rudolph Jaeger, M.D.; *The Ophthalmological Problem:* Edmund B. Spaeth, M.D.

17 April 1952

Raeder's Syndrome: Case Report. E. Howard Bedrossian, M.D. (Discusser: Robert H. Trueman, M.D.)

Meningiomas of the Tuberculum Sellae. Francis C. Grant, M.D. (Discusser: Glen G. Gibson, M.D.)

Physiological Factors in Refraction. Francis Heed Adler, M.D. (Discusser: Alfred Cowan, M.D.)

SECTION ON OTOLARYNGOLOGY[2]

16 January 1952

General Anesthesia in Otolaryngology. *Anesthesia in Otolaryngologic Surgery:* James E. Eckenhoff*, M.D.; *Anesthesia from a Bronchologist's Viewpoint:* Louis H. Clerf, M.D.; *Anatomic Abnormalities and Obstructions Complicating General Anesthesia in Otolaryngology:* Oscar V. Batson, M.D. (Discussers: Marshall Kerry*, M.D., Richard Brenneman*, M.D., James E. Landis*, M.D., and Joseph P. Atkins, M.D.)

[2] Abstracts of the presentations at this Section customarily appear in the *A. M. A. Archives of Otolaryngology.*

20 February 1952

Dinner meeting, followed by old movies of otolaryngologic interest, in honor of four outstanding members of the Section: Ralph Butler, M.D., George M. Coates, M.D., Walter Roberts, M.D., and George B. Wood, M.D.

19 March 1952[3]

HEMATOMA OF THE LARYNX FROM EXTERNAL TRAUMA. F. Johnson Putney, M.D. (Discusser: Morris Bender, M.D.)

THE EFFECTS OF DIHYDROSTREPTOMYCIN UPON THE VESTIBULAR MECHANISM. Julius Winston, M.D. (Discusser: James A. Moore, M.D.)

THE USE OF WATER SOLUBLE CONTRASTS MEDIA FOR BRONCHOGRAPHY. Joseph P. Atkins, M.D. (Discusser, John D. Kernan, M.D.)

SECTION ON PUBLIC HEALTH, PREVENTIVE AND INDUSTRIAL MEDICINE

31 March 1952[4]

DEVELOPMENT OF THE ALBERT EINSTEIN MEDICAL CENTER. Paschal F. Lucchesi, M.D.

PUBLIC HEALTH IN PHILADELPHIA, WHAT NEXT? James P. Dixon*, M.D.

CURRENT TRENDS IN LABOR MEDICINE. Joseph A. Langbord*, M.D. (Discussers: Charles L. Brown, M.D., Jacob Feldman*, Joseph Seitchick*.)

ABSTRACTS

Abstract 1

ANURIA FOLLOWING THERAPY IN LEUKEMIA. A. M. Frumin, M.D., and L. H. Beizer, M.D.

A case of chronic granulocytic leukemia is presented in which anuria occurred after oral administration of 3 grams of urethane daily for approximately 2 months. Cystoscopy revealed uric acid calculi in the urethra and obstructing one ureter. There had been no precipitous fall in the leukocyte count. The BUN was 76 mg.% and the serum uric acid 12 mg.% Intravenous fluids and oral potassium citrate caused a return to normal of renal function and the BUN and uric acid determinations.

The patient was again studied 14 months later. A normal uric acid creatinine response to ACTH was evidence against gout. Following baseline studies, urethane was again administered, in doses of 1.5 grams daily. After 28 days urinary tract symptoms occurred with the passage of uric acid stones. The BUN was 23 mg.% and the uric acid 8.1 mg.%. Urethane was discontinued, fluid intake increased, and the urine made alkaline. Crystalluria and stone formation ceased.

Nine previously published cases of anuria following therapy in leukemia were found. Most were chronic granulocytic leukemia. All had a precipitous fall in the leukocyte count and a marked elevation of the BUN and uric acid following X-irradiation. The time from the institution of therapy to the occurrence of anuria averaged 30 days.

The importance of careful management of therapy in leukemic individuals in the presence of a markedly elevated leukocyte count or signs of renal impairment is stressed. The value of rendering the urine alkaline to prevent the occurrence of uric acid crystalluria is indicated.

Abstract 2

RICKETTSIALPOX: REPORT OF FOUR APPARENT CASES IN PENNSYLVANIA. A. C. LaBoccetta, M.D., A. M. Perri, M.D., Harold L. Israel, M.D., and M. M. Sigel, PH.D.

Four cases of Rickettsialpox were presented. The first patient, a 14 year old white male, became ill on 5–1–49. The mother of this patient, age 49 years, became ill on 5–27–49, and another patient, a 30 year old white female, became ill 6–22–50. These patients lived in Richmond within 4 blocks of each other. The fourth patient, a 32 year old white

[3] Joint meeting, at the College, with the Section on Otolaryngology, New York Academy of Medicine.

[4] Joint meeting with Region No. 1, Pennsylvania Public Health Association.

male, became ill on 2-15-50. This patient presumably became infected at his place of employment, a pharmaceutical laboratory in suburban Philadelphia. Initial lesions and regional lymphadenitis were seen in 3 of the patients. All patients exhibited a discrete, papular, erythematous rash over extremities and torso except for the fourth patient who had a mild transient erythematous macular rash over the chest. The course of the disease was reviewed. All patients improved promptly on aureomycin therapy with disappearance of symptoms and rash, but persistence of the eschar for weeks after clinical recovery. All patients showed a Weil-Felix titer not higher than 1:80, positive complement fixation tests with antigen of the Rocky Mountain spotted fever-Rickettsialpox group in high dilutions, and strong complement fixation reactions with washed rickettsialpox antigen. Attempts to demonstrate the presence of a reservoir of infection in the home of two of the patients were unsuccessful. Of 80 blood specimens taken from neighbors of the patients, none showed any evidence of rickettsialpox infection. Serological tests were verified by the Department of Health of New York City (Dr. Morris Greenberg), and the Army Medical Department Research and Graduate School (Dr. J. E. Smadel).

Abstract 3

THERAPY OF ULCERATIVE COLITIS: COMBINED TREATMENT BY INTERNIST AND PSYCHIATRIST. Stanley H. Lorber, M.D., Harry Shay, M.D., and O. Eugene Baum, M.D.

Results are reported in the treatment of 14 patients with ulcerative colitis employing the combined efforts of internist and psychiatrist. Nine patients were severely ill and had some complication of the disease. One was moderately ill and 4 were classified as mild. Medical management followed all accepted principles. Initial psychotherapeutic efforts consisted of reassurance and encouragement. Daily interviews were begun by the internist as soon as it was judged advisable. Occasional interviews were conducted by the psychiatrist who also reviewed the material obtained by the internist. The psychiatrist then guided the therapeutic efforts of the internist who attempted to develop the patient's understanding of the emotional factors involved. Upon discharge from the hospital, patients who made a good psychological adjustment were followed by the internist. If emotional problems remained unresolved, both internist and psychiatrist treated the patient.

Eight patients who have been followed for over one year (3 for over 2 years) are completely rehabilitated. Of this group, five are entirely well and three have semi-formed stools as their only symptom. Four patients who have been followed for less than one year are also rehabilitated but of these two have mild symptoms. Two of the severely ill patients did not respond to supportive psychotherapy. They became psychotic on hormonal therapy and were subjected to surgery. We believe that the very encouraging results obtained, both with respect to immediate and long term management, strongly recommend this approach in the handling of this most devastating disease.

Abstract 4

A CLINICAL, BIOCHEMICAL AND PATHOLOGICAL STUDY OF HEPATIC COMA. S. C. Carfagno, M.D., R. F. De Horatius, M.D., C. M. Thompson, M.D., and H. P. Schwarz, M.D.

The clinical findings in eleven cases of hepatic coma were carefully studied. Special attention was focused on the etiology of the underlying liver disease and factors which tended to precipitate coma in these patients. Autopsies were available in all cases. Nine of the cases had an underlying portal cirrhosis, one had a carcinoma of the esophagus with metastases to the liver and one had hemochromatosis.

The extensive blood studies were grouped under four categories. The first group, routine blood studies in hepatic coma, included hemoglobin, white count, hematocrit, blood sugar, urea nitrogen and blood serology. The second group, liver function studies in hepatic coma, consisted of serum bilirubin, serum proteins, flocculation and turbidity studies, alkaline

phosphatase and prothrombin time. The blood electrolytes comprized the third group; this included a study of serum sodium, serum potassium, serum calcium, serum phosphorus, blood chlorides, CO_2 combining power of blood serum, and blood pH. The last group of studies were on protein, fat, and carbohydrate metabolites; this included levels of nonprotein nitrogen, uric acid, total blood fats, neutral fats, total fatty acids, phospholipids, cholesterol, cholesterol esters, pyruvic acid, lactic acid, total blood ketones, and alpha keto glutaric acid.

The investigators point out that most of the findings were consistent with severe liver damage and not peculiar to hepatic coma. However, the marked elevations in blood pyruvic acid, blood lactic acid, and total ketones may point to a basic cause for the coma. In addition the consistently low serum potassium values may be another clue as to the basic alteration resulting in hepatic coma.

Abstract 5

Eosinophilic Infiltration of the Gastrointestinal Tract. Henry J. Tumen, M.D., George I. Blumstein, M.D., and Edwin M. Cohn, M.D.

The case being presented is that of a patient with an allergic background who complained over a period of twenty years of symptoms suggestive of pyloric or high small intestinal intermittent obstruction. The important laboratory findings consisted of a persistent eosinophilia and x-ray studies which repeatedly revealed an abnormally large duodenal cap, duodenal diverticula and segmentary dilatation of several areas of jejunum and ileum. On the basis of the demonstration of pyloric obstruction, presumably due to scarring from previous ulceration at the apex of cap or to adhesions, operation was performed. At operation the distal half of the stomach wall was thickened uniformly and was of rubbery consistency. These findings extended through the pylorus and included half the length of the duodenum, which was distended to three times its normal size. Behind the pancreas a segment of duodenum was narrowed, and this was thought to be a congenital defect. Localized areas in the jejunum and ileum were found in which the serosa was edematous and the wall was thickened and rubbery to palpation. Histologic sections of the resected portion of the stomach were studied and cellular infiltration of the muscle reported. About eighty per cent of the cells were eosinophiles. It is believed that the gastric lesion found in this patient strongly suggests an allergic mechanism, although the duodenal stenosis could have contributed to these changes. The diagnosis of an allergic tissue response is consistent with the historical data and best explains the peripheral eosinophilia and tissue findings.

Abstract 6

The Use of Paritol C in the Treatment of Venous Thrombosis. Joseph B. Vander Veer, M.D., Elmer H. Funk, M.D., and Frank R. Boyer, M.D.

Paritol, a synthetic, heparin-like drug was used in the treatment of 60 patients with thromboembolic disease. The drug is given intravenously and its effect measured by the Lee-White clotting time. Its anticoagulant activity persists for 8 to 12 hours. The majority of patients were treated for only 48 to 72 hours and then maintained with dicumarol or Tromexan. The usual dose was 300 mg. every 12 hours. Therapy was controlled by clotting time values obtained just prior to dosage. Adequacy of therapy for 6 to 8 hours was demonstrated by interval tests. Transient but marked alterations in the prothrombin time followed Paritol administration. Clinical improvement equalled that which might have been expected with heparin.

Three patients early in the series experienced immediate, mild reactions. Impurities in less refined lots of the drug may have been a factor. One patient receiving 6200 mg. developed a transient partial alopecia. There were seven deaths. In only one were anticoagulants a possible contributing factor. At present there is need for long term studies with large total dosage of the drug. Paritol seems to offer

considerable promise as an anticoagulant. However, further clinical use under controlled conditions is indicated before this drug is used generally.

Abstract 7

APPRAISAL OF A FIFTEEN-YEAR FOLLOW-UP OF BCG VACCINE. Joseph D. Aronson, M.D., and Charlotte Ferguson Aronson, A.B.

The evaluation of an immunizing agent for diseases which show a naturally falling rate is difficult. This has been especially true of tuberculosis, the mortality of which has shown a steady decline since 1865.

Although BCG (B. Calmette and Guerin) vaccine has been used extensively throughout the world, the diversity of opinion regarding its use is due partly to lack of adequate controls.

To assess the role of BCG vaccine as an immunizing agent against tuberculosis, a joint investigation was undertaken in 1936 by the Henry Phipps Institute, University of Pennsylvania and the Health Division, Office of Indian Affairs to study under control conditions the value of BCG vaccine in the prevention of tuberculosis.

A total of 3008 tuberculin negative persons ranging in age from less than one year to 20 years were divided alternately into two groups on the basis of age and sex. A group totalling 1551 persons received an intracutaneous injection of BCG vaccine while a second group of 1457 persons served as controls. Both groups were examined annually for the first 11 years of the study by means of the tuberculin test and roentgenological examination of the chest. The results of these studies were reported in 1947 before the College of Physicians of Philadelphia as the seventh Alvarenga Lecture.

In 1951, fifteen years after the initiation of the study a recheck was conducted of both vaccinated and control groups. All but 30 of the original 3008 persons were accounted for. The 1551 vaccinated were observed for a total of 21,245 person years during which time 71 had died from all causes, a rate of 3.34 per 1000 person years of observation. The 1457 controls were observed for a total of 19,520 person years during which time 128 persons died from all causes, a rate of 6.56 per thousand person years of observation. Of the 71 deaths from all causes among the vaccinated, 12 were due to tuberculosis, while of the 128 who died from all causes among the controls 65 were due to tuberculosis. When the mortality rate per 1000 persons was calculated on a cumulative basis for a period of 15 years, it was found that the mortality rate for tuberculosis was 8.9 for the vaccinated and 49.06 for the controls. The cumulative mortality rate per 1000 persons for non-tuberculous causes was 40.07 for the vaccinated and 45.94 for the controls.

Of the 65 deaths from tuberculosis among the controls 31 were due to acute hematogenous type of tuberculosis while among the 12 vaccinated four were of the acute hematogenous type. Two of these four deaths occurred in those who were infected at the time they were vaccinated as indicated by a marked Koch phenomenon at the site of vaccination.

Abstract 8

INDICATIONS FOR INTRACRANIAL SURGERY IN THE COMMON STROKE: A REPORT OF 29 CASES. Michael Scott, M.D.

The author considers the following to be indications for surgical intervention:

A. Symptoms and signs of a *progressive* increase in intracranial pressure: 1) stupor or coma; 2) slowing of pulse rate (below 60) and respirations (below 16); 3) increase in spinal fluid pressure (above 160 mm. of water); 4) choke discs, if the symptoms persist for days.

B. Any neurological signs of focal involvement of the brain showing progression: 1) aphasia (sensory or motor and usually early, before stupor or coma); 2) visual field cut (early); 3) hemiplegia; 4) unilateral fixed dilated pupil; 5) unilateral convulsions.

C. Roentgenograms revealing a shift of the pineal gland away from the suspected cerebral hemisphere.

D. Arteriography showing an aneurysm or space-taking clot.

Twenty-eight consecutive patients were operated upon by the writer (and one by his associate Dr. Frederick Murtagh) for spontaneous intracerebral hemorrhage. In every case the neurological signs permitted localization to the involved hemisphere. In four cases the hemorrhage was caused by a rupture of the artery with no visible aneurysm. In one case an aneurysm of the right middle cerebral artery was found and clipped. A chorioepithelioma and malignant melanoma was the cause in two cases, and no obvious cause was found in the remaining twenty-two.

Ten patients died in the hospital following operation. The operative mortality was 34%. If the tumor cases are excluded, the mortality rate is 30%.

Seventeen patients recovered from operation and were discharged. Of these, five are working, four regularly and one part-time. Five are ambulatory and come to the office for recheck examinations. In all, the involved hand is useless and the involved extremity is partly supported by a brace. Two patients died following discharge, one from coronary artery thrombosis seven months later; the second from another cerebral hemorrhage four months following discharge. One patient could not be located. Two patients are in the hospital, one with no improvement two months following operation and the other with marked improvement two weeks following surgery.

Conclusions: Spontaneous intracerebral hemorrhage usually produces symptoms of an expanding lesion and in the majority of cases is associated with bloody spinal fluid under increased pressure.

It must be differentiated from cerebral thrombosis or embolism because the treatment of the latter as advocated by some with stellate blocks or anticoagulants might prove fatal if used in the treatment of cerebral hemorrhage.

Although an occasional case of intracerebral hemorrhage recovers spontaneously the majority terminate fatally. Prompt diagnosis and operation in cases showing progression in signs and intracranial pressure will save lives.

Abstract 9

THE INTERRELATIONSHIP OF THE ENDOCRINES and CARBOHYDRATE METABOLISM BASED ON A CASE OF ADDISON'S DISEASE DEVELOPING IN A DIABETIC. Paul Todd Mackler, M.D., E. K. Sifre, M.D., and Joseph T. Beardwood, Jr., M.D.

This paper is a report on a woman who was a known diabetic and hypertensive for four years and then developed adrenal insufficiency. The hypertension disappeared; her insulin requirement fell from 60 units of Protamine Zinc insulin daily to 10 units daily; and she developed pigmentation, severe gastrointestinal upsets, weight loss and weakness. Laboratory studies showed her 17-ketosteroids to be low, her 11-desoxysteroids to be low, but her 11-oxysteroids were normal, as evidenced by direct measurement on one of two occasions, by a normal eosinophil fall test and by a normal fasting blood sugar.

The authors postulate that the patient's hypertension and hyperglycemia prior to the development of Addison's disease may have been due to an excessive production of 11-oxysteroids and that subsequently the adrenal failure brought these hormones down to a normal level, whereas the 17-ketosteroids and 11-desoxysteroids were reduced below normal.

The pertinent literature on the coincidence of Addison's disease and diabetes mellitus is discussed.

Abstract 10

THE ABSENCE OF TRANSFUSION REACTION IN A PATIENT WITH GRANULOCYTIC LEUKEMIA RECEIVING ACTH AND CORTISONE. Ralph M. Myerson, M.D., and A. Henry Clagett, Jr., M.D.

A 29-year-old Negro was admitted to the hospital on March 21, 1951. The diagnosis of acute granulocytic leukemia was established by peripheral blood and bone marrow studies. On March 23, therapy with ACTH was in-

stituted. This was replaced by cortisone on March 29. During a three-day period from March 28 to March 30, the patient received a total of 1400 cc. of Type A Rh-negative blood with a result in slight rise in red blood count and hemoglobin and no apparent adverse effects. On April 5, when further transfusions were indicated, re-typing of the patient's blood revealed it to be Type B. Samples of blood taken prior to the first transfusions were checked and it was found that the original typing and crossmatching had been erroneous and that the patient had received 1400 cc. of incompatible blood. He was followed very closely thereafter and no adverse effects were noted until his death on April 24. Serial anti-A-agglutinin titers, Coombs's test, and survival time of donor cells were not determined.

Although the reason for the absence of a transfusion reaction is unknown, the case is being presented because of the possibility that the administration of ACTH and cortisone was a factor.

Abstract 11

THE EFFECTS OF ACTH AND CORTISONE ON PATIENTS WITH CHRONIC HEPATIC DISEASE. W. Paul Havens, Jr., M.D., Ralph M. Myerson, M.D., and Irvin N. Carroll, M.D.

Sixteen patients with hepatic cirrhosis or chronic hepatitis were treated with ACTH (four patients), cortisone (six patients), or progesterone (six patients) for periods of time ranging from one to seven weeks. Determinations of the urinary excretion of formaldehydogenic corticoids, free and total 17-ketosteroids, and pregnanediol were made in certain patients. During the period of observation, ten patients improved, two remained apparently unchanged, two became worse, and two died. Euphoria and increase in appetite occurred frequently in the patients treated with ACTH or cortisone, and augmented retention of fluid was common in this group. Two patients had rapid increase in ascites and became stuporous during or shortly after cessation of therapy with cortisone, and one of these died. In those patients who improved, with two exceptions, the alterations in hepatic function and general condition could not be distinguished from those which might have occurred with the regimen of rest and diet which these patients received. It is possible, however, that the increase in appetite which occurred in certain instances had a beneficial effect. Two patients manifested changes which appeared to be more directly related to therapy. One of these had a decline to normal of serum bilirubin when ACTH was given, with an increase when ACTH was discontinued. In a second patient, fever, associated with a urinary tract infection, disappeared when cortisone was given, with reappearance of fever when it was discontinued.

Abstract 12

A TWO-YEAR EXPERIENCE WITH THE USE OF 1-HYDRAZINOPHTHALAZINE (CIBA 5968—APRESOLINE) IN THE TREATMENT OF ESSENTIAL HYPERTENSION. M. August Lindauer, M.D., and Joseph H. Hafkenschiel, M.D.

The action of Apresoline is chiefly central, with a moderate degree of adrenergic blocking action. In addition to its hypotensive action, it has been shown to increase renal blood flow and decrease cerebro-vascular resistance.

The drug has been shown to be non-toxic in therapeutic dosage, although numerous side effects have been noted.

The single effective dose range was from 75 to 200 mg. either three or four times daily, with the average dose being 125 mg. four times daily. In our experience no tolerance to the drug was noted. Patients who were placed on a placebo preparation showed an increase in pressure with a drop when the use of Apresoline was resumed.

Forty patients have been treated with Apresoline for a period of 12 to 24 months. The Smithwick Classification was used for grouping as to the severity of the hypertensive vascular disease and clinical benefit was

measured by improvement in the electrocardiogram, reduction in heart size, improvement in eye grounds and improvement in renal function.

In those who fell in the Smithwick Group I and II Classification, 15 out of 26 showed a satisfactory fall in blood pressure, in Group III, four out of seven, and in Group IV, only one out of seven.

Only seven patients showed clinical improvement; four showing improvement in retinopathy and three improvement in the electrocardiogram.

It may therefore be concluded that patients with severe essential hypertension, but with good cardiac, renal and eye ground findings, are suitable cases to be tried on medical management with such a preparation as Apresoline.

Pathological Society of Philadelphia

PROCEEDINGS

N. S. Vol. 40: October, 1951–May, 1952

Clark E. Brown, *President*
Warner F. Sheldon, *Secretary*

October 11, 1951

SYMPOSIUM ON ISLETS OF LANGERHANS

THE PHYSIOLOGY OF THE ISLETS OF LANGERHANS. I. J. Pincus. (*Abstract 1, below*)

THE ANATOMY OF THE ISLETS OF LANGERHANS. A. J. Ramsay. (*Abstract 2, below*)

PATHOLOGY OF THE ISLANDS OF LANGERHANS. A. Reynolds Crane. (*Abstract 3, below*)

November 8, 1951

ELECTROPHORETIC STUDIES ON MARROW AND SERUM PROTEINS IN MULTIPLE MYELOMA. Gail L. Miller and Clark E. Brown. (*Abstract 4, below*)

IDENTITY OF GOMERULAR NEPHRITIS AND LIPOID NEPHROSIS. William E. Ehrich and Carolyn Forman. (*Abstract 5, below*)

December 13, 1951

SYMPOSIUM ON ENDOMETRIAL HYPERPLASIA

ETIOLOGY OF HYPERPLASIA OF THE ENDOMETRIUM. B. L. Wellenbach. (*Abstract 6, below*)

RELATIONSHIP TO ENDOMETRIAL CARCINOMA. A. E. Rakoff. (*No abstract received*)

PATHOLOGY OF HYPERPLASIA OF THE ENDOMETRIUM. Robert L. Breckenridge. (*Abstract 7, below*)

January 10, 1952

INFRARED SPECTROSCOPY OF TISSUES

PRINCIPLES AND PRELIMINARY FINDINGS. H. P. Schwarz. (*Abstract 8, below*)

POTENTIALITIES FOR PATHOLOGY. Helena E. Riggs. (*Abstract 9, below*)

February 14, 1952

SECRETORY CYSTIC DISEASE AND PLASMA CELL MASTITIS IN THE FEMALE BREAST. Helen Ingleby and J. Gershon-Cohen. (*Abstract 10, below*)

STUDY OF HUMAN PATHOLOGIC TISSUES BY *in Vitro* CULTURE. Machteld E. Sano. (*Abstract 11, below*)

March 13, 1952

Annual Joint Meeting with Section on Clinical Pathology of the Philadelphia County Medical Society.

May 8, 1952

Slide seminar: DISEASES OF THE THYROID GLAND. Robert C. Horn, Jr.

ABSTRACTS

Abstract 1

THE PHYSIOLOGY OF THE ISLETS OF LANGERHANS. I. J. Pincus.

Many observations and a wide variety of experiments lead to the conclusion that the beta cell secretes insulin. Although a rich nerve supply has been demonstrated to the islets and stimulation of the vagus nerve apparently causes a release of insulin from the beta cell, the role of the nervous mechanism remains obscure. Present evidence suggests that the level of glucose in the blood going to the pancreas is the most important factor in regulating the release of insulin from the beta cell. It may well be that insulin administration, starvation, glucose administration or anterior pituitary extract, etc., affect the beta cell by means of their primary effect on the blood glucose level.

The alpha cell of the islet contains granules

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which differ from the beta cell granules in appearance, staining properties and response to various chemical agents and physiologic stimuli. It has been suggested that the alpha cell secretes a hormone called the hyperglycemic-glycogenolytic factor. This substance produces a rise in blood sugar when injected intravenously by liberating glucose from hepatic glycogen. The mechanism of its action has been studied by Sutherland and Cori who find that it activates a hepatic phosphorylase. The mechanisms which control the activity of this substance have not been adequately studied.

The Islets of Langerhans, therefore, in addition to their well established insulinogenic function may play another role in metabolism by reason of the alpha cell which may secrete a second hormone, the hyperglycemic-glycogenolytic factor.

Abstract 2

THE ANATOMY OF THE ISLETS OF LANGERHANS.

A. J. Ramsay.

The two pancreatic buds, in their early growth and differentiation, produce both endocrine and exocrine portions of the pancreas. The ducts and epithelial strands from which arise both acinus and islet cells retain, in the different species of animals, a variable degree of proliferative ability. For example, the guinea pig can regenerate islet cells to a marked extent, even after alloxan treatment.

The islets of Langerhans are composed of branching and anastamosing networks of cords and plates of epithelial cells intimately related to close-meshed capillary plexuses and supported by delicate reticular connective tissue frameworks which serve as indistinct capsules for the islets. The relative number of islets, their cellular makeup, and their distribution within the pancreas shows great variation in different species as well as in individuals of the same species.

Special staining procedures must be employed to demonstrate clearly the different cell types. The reliable chrome hematoxylin-phloxine method of Gomori has given the most consistent and satisfactory results for most workers. The islets exhibit two basically different cell types, alpha and beta cells. Not all alpha and beta cells are grouped into islets for small groups as well as isolated cells occur widely scattered in the pancreas and have been reported in the walls of the gastrointestinal tract, although positive identification methods are difficult to utilize in the latter case.

Alpha cells contain alcohol insoluble cytoplasmic granules that stain red with Gomori's stain while beta cells possess alcohol soluble granules that stain blue-black. The number of granules and their distribution within islet cells depends upon the functional state of the organism. Beta cells in a fasting individual are fairly small, have many large granules, and exhibit a small, contracted "inactive" Golgi apparatus. After a large carbohydrate meal the beta cells show increased size and a loss of granulation especially in the vicinity of the expanded "active" Golgi apparatus. Even after all the typical darkly staining beta granulation has disappeared (due to their prolonged secretion of insulin) there remains a faintly staining cytoplasmic granulation of unknown composition. The alpha cells show functional loss of granulation, decrease in size, and an activated Golgi apparatus after prolonged intravenous administration of glucose. Their functional cycle has not been studied with the same intensity as has that of the beta cells.

Additional cell types described in the literature (ex., "d" cell of Bloom) are not universally accepted. It is felt that the different appearances of alpha and beta cells in their various functional phases, demonstrated by the different staining methods, explain the various additional cell types ascribed to the islets. Each investigator must first become thoroughly familiar with the histology and cytology of the islets of the forms he is working with before he will be able reliably to interpret his experimental results.

Abstract 3

PATHOLOGY OF THE ISLETS OF LANGERHANS. A. Reynolds Crane.

Morphologic changes in the islets occur under two categories—degenerative (pancreatitis, diabetes mellitus) and proliferative (hyperplasia, adenoma and carcinoma). In acute pancreatitis diabetes occurs in 10% of cases due to islet destruction, but permanent diabetes occurs in only half of these because of islet regeneration. Chronic pancreatitis leads to diabetes in 25% of the cases. The pathology in either case is disappearance of the islets rather than intrinsic change. In diabetes hydropic degeneration of the beta cells and lymphocytic infiltration occur in acute fulminating forms, while fibrosis and hyalinization (? amyloid) occurs in older persons and disease of long duration. Experimental diabetes has not produced the late changes encountered in man.

Tumors over 1 cm. usually produce the clinical signs of hyperinsulinism. 12% are multiple. They occur most frequently in the tail, but involve all portions of the pancreas. Benign lesions are encapsulated and violaceous. Benign and malignant tumors show duct, solid, or tubular patterns. There is no histologic proof of malignancy, metastases alone establishing the cancerous nature of a lesion. Failure of surgery to alleviate clinical symptoms means residual tumor. Radical surgery on the basis of suspected malignancy in a histologic section is not justified.

Abstract 4

ELECTROPHORETIC STUDIES ON MARROW AND SERUM PROTEINS IN MULTIPLE MYELOMA. Gail L. Miller and Clark E. Brown.

An electrophoretic study was made of the plasma and extracts of tumor of a typical multiple myeloma subject. Tumor was obtained at autopsy from the vertebrae, ilium, and lymph nodes. Control tests were made with corresponding normal plasma and normal tissues, and with tumor from a myelogenous leukemia subject. Vertebral marrow obtained from a multiple myeloma subject that had undergone urethane treatment also was investigated. A large, sharp peak, having a mobility somewhat lower than that of normal gamma globulin, characterized the electrophoretic pattern of the plasma and the tumor extracts of the test subject. In special studies, an effort was made to exclude the effects of blood or lymph as possible contaminants in the tumor extracts. The characteristic sharp peak was not observed in any of the control experiments. It was also absent in the extract of the marrow of the urethane treated multiple myeloma subject, due, presumably, to the effect of the urethane in inhibiting the growth of the myeloma cells. The results appear to support the view that myeloma cells are the site of formation of the abnormal plasma proteins of multiple myeloma.

Abstract 5

IDENTITY OF GLOMERULAR NEPHRITIS AND LIPOID NEPHROSIS. William E. Ehrich and Carolyn Forman.

Whereas Volhard and Fahr, and Addis and Oliver, believed that there is only one diffuse glomerular nephritis which passes through various stages or courses, and that lipoid nephrosis is a disease entity distinct from nephritis, Ellis and his associates distinguish two different nephritides which they call Type I and Type II nephritis, and they deny the identity of lipoid nephrosis. Similarly Bell distinguishes between hemorrhagic glomerular nephritis, diffuse proliferative glomerular nephritis and membranous glomerular nephritis, the latter including lipoid nephrosis.

Those who believe in the existence of a genuine lipoid nephrosis refer to patients who never develop progressive renal failure and if dead from intercurrent disease show no recognizable glomerular lesion, while those who deny its occurrence point to the common clinical observation that children with lipoid nephrosis not infrequently develop progressive renal failure and terminally are clinically and morphologically undistinguishable from chronic glomerular nephritis.

The observations presented here are based on clinical and morphological studies of human glomerular nephritis and lipoid nephrosis and on biochemical and morphological studies of experimental nephritis and lipoid nephrosis in rabbits and rats produced with anti-kidney serum and with foreign protein. It was confirmed that the experimental nephritis due to anti-kidney serum in rabbits is the same as human glomerular nephritis, i.e., *intra*capillary nephritis, whereas the disease caused by foreign protein does not resemble human nephritis, but is an *inter*capillary nephritis. The disease caused by large doses of a potent anti-kidney serum in rats, on the other hand, is the same as lipoid nephrosis.

Lipoid nephrosis in both man and rat is characterized morphologically by absence of proliferative changes and by thickening of the basement membrane as first observed by Bell. The latter is due to imbibition of the membrane with plasma components including fibrinogen and other proteins, mucopolysaccharides and fat.

Intra- and intercapillary glomerular nephritis and lipoid nephrosis in both man and animals, like other glomerular diseases, are in a certain number of cases complicated by exudation into the capsular space, subsequent crescent formation, and the replacement of the crescent by a hyaline material (*extra*-capillary "nephritis"). Whereas the uncomplicated cases may recover, those who develop crescents die sooner or later from renal failure depending upon the number of glomeruli involved.

Abstract 6

ETIOLOGY OF HYPERPLASIA OF THE ENDOMETRIUM. B. L. Wellenbach.

In 1878, pathologists and gynecologists recognized the association between persistent uterine hemorrhage and a conspicuous thickening of the endometrium.

Endometrial hyperplasia occurs most often in multiparous women who are in the latter years of reproductive life or beyond. Many authors by their clinical and experimental evidence, believe and have proven, that endometrial hyperplasia is produced by the prolonged and unopposed action of estrogen on the endometrium. When endometrial hyperplasia occurs in younger women, it is found in association with pubertal dysfunction, menstrual irregularities, or anovulatory sterility. The part the ovary may play in the production of this condition is divided into four distinct parts (1) protracted follicular activity, (2) prolonged estrogen stimulation, (3) absence of functioning corpora lutea and (4) lack of normal endometrial response to progesterone.

The ovary is partially dependent upon the anterior pituitary gland for its rhythmic physiology. Disturbance of the latter will produce ovarian dysfunction and subsequently endometrial hyperplasia. This abnormal condition of the endometrium may be produced in post-menopausal women by the ovarian stroma, granulosa cell tumors and by the adrenal gland. This is due to the production of estrogens.

Other etiological factors in the production of endometrial hyperplasia are (1) general systemic diseases or emotional disturbances interfering with ovulation and corpus luteum formation, (2) disturbances in the metabolism or inactivation of the estrogens resulting from liver disease or nutritional factors, (3) disturbance in uterine responsiveness to ovarian hormones and (4) the exogenous administration of estrogens for therapeutic purposes.

Whatever the definitive etiological factor may be, it is the prolonged and unopposed action of estrogen on the endometrium which produces hyperplasia.

Abstract 7

PATHOLOGY OF HYPERPLASIA OF THE ENDOMETRIUM. Robert L. Breckenridge.

Hyperplasia is one of the most common lesions seen by the pathologist examining endometrial tissue. It accounts for approximately forty percent of the material examined from patients with functional uterine bleeding.

Most classifications of endometrial hyperplasia are based upon microscopic variation.

Cystic hyperplasia is probably the most familiar. There is a proliferation of all of the tissue elements, both epithelial and stromal. The glands are greatly increased in diameter, giving the characteristic swiss-cheese pattern. A similar histologic type is seen in almost three-fourths of post-menopausal women, the so-called senile or atrophic endometrium with cystic change. A more important group, from the stand point of diagnosis, is adenomatous hyperplasia. The histologic pattern varies from one that is difficult to differentiate from a normal functioning hyperplasia to one so bizarre that it resembles adenocarcinoma. The glandular epithelium proliferates at the expense of the stroma, producing fine subdivisions of the glands, in such numbers that the glands may be back-to-back; while the cells show stratifications, papillary projections, and infoldings. Reversion to a squamous or tubal metaplasia is an interesting and unusual occurrence. As the glands continue to proliferate they produce a crowded, lawless pattern. Anaplasia may occur with variation in size, shape, cytoplasmic staining, and polarity. But the basement membrane remains intact.

The histories of three patients were presented to show that carcinoma can develop in a previous hyperplastic endometrium. All three patients were either menopausal or post-menopausal when these symptoms began with hyperplasia.

Abstract 8

INFRARED SPECTROSCOPY OF TISSUES: PRINCIPLES AND PRELIMINARY FINDINGS. H. P. Schwarz.

For infrared spectroscopy of tissues frozen sections of 50 u thickness are prepared from the rapidly frozen organs, immediately after the animal is killed by decapitation. These sections are transferred to cooled silver chloride plates and dried in a desiccator over silica gel at about 20 degrees C for at least 24 hours. The dried plate is placed into a cell holder and covered with a mask either 8 x 5 mm, 5 x 5 mm, or in some instances 3 x 3 mm areas so that the infrared energy could pass only through the part of the sections selected for the examination. Spectra of the sections and blanks, covered with the same masks, are recorded from 15 u to 1.5 u wave length with the Beckman IR2 infrared spectrophotometer. Histological studies are made from sections cut from the block remaining after sections for spectroscopy are taken.

Qualitative infrared spectroscopy of tissues in rabbits showed 2 different types of absorption bands within the different wave length regions. In the high frequency region, e.g. below 8.1 u, all the tissues showed similar bands which were related to protein vibrations, in the low frequency region, e.g. between 9 u and 11 u, on the other hand, the absorption bands in tissue spectra were so characteristic for the individual organ that it was frequently possible to identify the organ from the infrared spectrum. The characteristic spectral fingerprint pattern of neural tissue and of all visceral tissues so far examined has proved to be similar in different species (rabbit, rat). It is felt that this species unspecificity will greatly facilitate comparative studies.

For assignments of tissue spectra, a large number of pure compounds related to nucleic acids, proteins, carbohydrates, and lipids have been studied. The spectra of the pure compounds were compared with the spectra of various tissues. Additional assignment work utilized changes of tissue spectra after extraction with lipid solvents, after extraction of nucleic acids, or after enzymatic digestion with nucleases. These studies permit the conclusion that the characteristic spectra of neural tissues are caused by lipids and lipid containing substances. The spectra of muscle are probably related to myosin (D. W. Wood: Science *114*, 36, (1951) and own data). Assignments in visceral tissues are in progress.

For quantitative estimations, ratios of optical densities rather than simple density measurements must be used, since thickness of sections is not constant and cannot be determined with sufficient accuracy. The estimation of the ratio between density of a

tissue specific band and an internal standard (a band related to a protein) is independent of thickness of the sections and can be carried out with high accuracy. Such estimations in brain tissue of control animals and animals in insulin shock indicated significant changes in the brain in insulin shock.

Examination of brain tissue from adult and fetal rats revealed great spectroscopic differences apparent on qualitative study of the recordings. Quantitative spectroscopy of these brain sections before and after extraction with lipid solvents indicated that the brain tissue of fetuses contained much less free lipids than the brain of adults.

(These investigations were carried out in collaboration with Drs. H. E. Riggs, C. H. Glick, J. McGrath and Mr. W. Cameron).

Abstract 9

INFRARED SPECTROSCOPY OF TISSUES: POTENTIALITIES FOR PATHOLOGY. Helena E. Riggs.

The limitations of histologic methods are more evident in the study of the nervous system than in other branches of pathology. The neuropathologist has always utilized many staining techniques in his efforts to interpret the substrata of nervous disorders but even with these is often able to give only a descriptive diagnosis which fulfills neither pathologic or physiologic criteria. Histologic methods have proved disappointing in many of the chronic nervous disorders such as the chronic choreas, Parkinson's syndrome, and some forms of cerebellar ataxia as well as in certain acute conditions as Landry's paralysis, and Gullian-Barre syndrome. Listing the deficiencies of histologic methods for the investigation of nervous diseases does not imply that infrared spectroscopy offers the ultimate solution but is rather a plea for the introduction of new methods of attack on the problem.

Abstract 10

SECRETORY CYSTIC DISEASE AND PLASMA CELL MASTITIS IN THE FEMALE BREAST. Helen Ingleby and J. Gershon-Cohen.

The object of this communication is to achieve wider recognition of the above entities and to dispel some of the fallacies which have arisen regarding them.

Secretory cystic disease has been described under the rather confusing title of "comedo mastitis". Since it represents an abortive attempt at secretion on the part of a non-lactating breast the term secretory cystic disease is to be preferred.

Plasma cell mastitis is a complication of secretory cystic disease. It is a chemical inflammation caused by the products of disintegrated colostrum cells in the ducts. Colostrum cells arise in part from the duct epithelium and in part from fat-laden histiocytes which wander into the ducts.

Text books state that plasma cell mastitis is rare. Actually the focal form is common, but often passes unrecognized by pathologists and surgeons who think only of the generalized form. Bilateral plasma cell mastitis is said to be rare, (Cutler, 1949). Our x-ray studies show that it is the rule. Fortunately for women, most cases are asymptomatic. When present, the symptoms are fairly clear cut and the lesion is not difficult to recognize. X-ray examination will clinch the diagnosis. Secretory cystic disease and plasma cell mastitis do not predispose to cancer. Treatment is often unnecessary. In severe cases Cutler recommends x-ray followed by surgery. In mild cases, where pain or nipple discharge is present, x-ray treatment alone would probably be sufficient. If operation is decided on, the whole of the affected area should be removed, otherwise a discharging sinus may follow.

Abstract 11

STUDY OF HUMAN PATHOLOGIC TISSUES BY *in Vitro* CULTURE*. Machteld E. Sano.

In vitro culture and study of pathologic tissues is an unexplored field of pathology, a study of the growth of diseased tissues and cells *in vitro*, a "kinetic" pathology. Simplified

* Supported in part by U. S. Public Health Service, Committee on Growth.

methods, dried media, rapid fixation and staining have rendered this approach as simple, if not simpler, than bacteriology. Its main difficulty resides in our ignorance as to the behavior of pathologic tissues *in vitro* but it is this very reason which makes it a rewarding study of interpretation and correlation. Human embryonic as well as adult brain tissues have been grown and studied with movies. Included in these have been approximately sixty brain tumors. Pleural effusions in tissue culture reveal our lack of knowledge of the effect of disease on cells and of cellular potentialities. In placental tissue correlation with hormone studies have confirmed the role of the Langhans cell. Movies of growing tissues are time consuming and sometimes complicated to make but are an unending source of information on hitherto unsuspected characteristics of cell behavior. The diagnostic value of tissue culture is still in the experimental stage and will have to be used by more laboratories and over a long period of time, before it can be evaluated.

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Deaths

J. Harold Austin (1952)
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Robert G. Torrey (1941)
Samuel M. Wilson (1951)

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The Concept of Homeostasis in Medicine*

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MEDICINE has always had a double aspect: that of an art and that of a science. It is primarily the art of healing, and has traditionally been assimilated to the handicrafts. We need only think of the medieval assimilation of the surgeon to that of the barber, and of the fact that in the traditional orthodox Jewish order of society, in which every man was expected to have a handicraft, no matter how learned he might be, and no matter how great his reputation as a banker or financier, medicine was counted among the handicrafts and even as the handicraft of greatest dignity. It is indeed not too much to see in this tradition a part of the very active force which still sends Jewish boys into medicine.

However, although medicine has at all times been a handicraft and still is, it is that one of the handicrafts which perhaps makes the greatest intellectual demands on its practitioners. These practitioners have always been an essential and widespread component of the general intellectual climate of all countries. It is therefore natural that the attitude of the physician toward his own craft has at all times been a mirror of the general currents of thought.

The philosophy of the ancients was largely dominated by diverse views of the elements in the universe. These things were supposed to regulate by their own nature all action and behavior. The elements were air, water, earth, and fire. Parallel to these, the ancient physician conceived that the clue to health and disease was to be found in the interaction of a number of humors: the fiery, the windy, the watery, and the earthy. This medicine of the elements which acted by their own nature in some unprecise way dominated all medical thought until the end of the middle ages, when the weight of tradition began to be given up in medicine, as elsewhere, for the evidence of the observer and the experimenter.

For a considerable period the mass of new observations in medicine was too great to be digested and modeled into a reasoned study of the processes of the human organism. Anatomy was well in advance of physiology, and this in turn of pathology. It was only when the artist-anatomists of the Renaissance had become well acquainted with the appearance and arrangements of the parts of the dead body that even the grossest questions of the functioning of these parts when alive could be intelligently asked. Thus, the earliest of the significant modern physiologists belonged to

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the period when anatomy was already well advanced.

For remember, the first triumphs of physiology were in the very grossest matters. The one difficult point in the discovery of the circulation of the blood was the observation of its flow through the capillaries; and even before Harvey had observed this in the foot membrane of the frog, Servetus had conjectured the necessity of something of the sort. In general, for the doctors of that day the individual organs were lumps of tissue, each to be given a certain massive function as a whole, and no physiology was possible that went beyond a certain crude block diagram of their functioning. Nothing further was to be expected until the coming of the microscope and of a riper chemistry.

The microscope opened vast new fields, both of observation and of conjecture; but at the beginning the microscope was a very misleading tool. At the beginning the new vistas opened into the very small seemed to be endless. For example, Leeuwenhoek believed that in the newly discovered spermatazoön he could discern the head and body and legs of a folded-up embryo, which itself contained all the organs of a human being, and perhaps spermatazoa of its own of a second degree of minuteness.

Thus, while the microscope led at once to the new study of histology and the scalpel of the dissector had led to the older gross anatomy, it did not lead at once to an understanding of the processes of life. In a similar way, the new chemistry that was developing out of the magic of the alchemist and the simples of the herb doctor was too coarse a tool to penetrate into the vast complexity of living processes. Even before Lavoisier and the discovery of oxygen, it was perhaps possible to formulate a crude phlogistonist version of the main facts of respiration, without the slightest notion of how these large-scale processes were carried out in detail.

Thus the early nineteenth century saw medicine in which the various processes were associated with the different organs in a global way, without much understanding of what this localization of function might really mean. The heart pumped the blood, the stomach and intestines digested food, the kidneys discarded waste matter, and the nervous system acted as a communication mechanism. Even before the brain began to be understood with any precision, the phrenologists had developed a fictitious attribution of various mental functions to supposed organs of the brain. They found organs of aggressiveness, philoprogenitiveness, and the like, which have long vanished from our neurological textbooks.

This attempt to localize every action in the nervous system has survived in a different and more scientific form down to the present day. It has a certain amount of scientific evidence behind it. When certain regions of the cerebral cortex are removed, quite definite effects are produced in certain motor or sensory functions; and when the same regions are stimulated, we find quite definite muscular twitchings and false sensations.

Nevertheless, the correspondence between position in the cortex and function is far less complete than many of us would like to have it. In the first place, there are large areas in the cortex which have not been assigned any precise local function. In the second place, we have a record of the ablation of large regions of the cortex without any such profound and permanent change of mental and nervous function as we should naturally expect. Pasteur did a very large part of his intellectual work with the greater part of one hemisphere ruined by a massive hemorrhage; and although it is true that this was in his right or less important hemisphere, by no means all very extensive lesions of the dominant hemisphere are followed by permanent consequences as drastic as the orthodox views on cerebral localization would indicate. Many a paralysis that starts out after the standard textbook fashion is alleviated with time into a not too conspicuous weakness of the affected area, by a process of recovery or of delegation of function to other parts of the brain according to a pattern which is not too well understood.

In other words, the conventional dictionaries which interpret each part of the brain in terms

of its local function and the particular parts of the body which are under its command is too crude a picture to give a completely satisfactory clinical account of what is happening, let alone a completely satisfactory physiological account. Indeed, our better knowledge of nervous structure and nervous function should put us on our guard against any view involving excessive localization. The nerves are structures made of long fibers running in parallel, and the upshot of all our anatomical and physiological knowledge is that their main function is to act as transmission cables for impulses running along them. The rest of the nervous system is made up of cells very similar to those associated with the fibers of the nerves and of processes quite analogous to nerve fibers. The whole system is an extremely intricate communication net of fibers with loci of intercommunication, known as synapses, which at some time are in a position to carry messages and at other times are not. While this may not be an exhaustive account of all that the nervous system contains, it is a valid account as far as it goes, and shows a parallelism to the automatic telephone central or the electronic computing machine which is conspicuous to even a casual inspection.

Now these latter man-made devices have a physiology which is far better known to us than that of the nervous system. If one thing is perfectly clear about them, it is that they do not show a strict localization of function. To go from an ingoing trunk of a telephone exchange to an outgoing trunk involves the functioning of many communication lines and relays which are joined together for the purposes of a particular call by the orders transmitted through the dials of one of a number of distinct telephone sets. The high speed electronic computing machine has a bank of distinct adders and multipliers from which we can assemble by proper connections a sequence or net of those able to carry out a given mathematical process. The functioning of either of these two sorts of machine as a whole does not belong to particular points in the assembly, but is distributed over the assembly as a working organism.

I do not know whether the young people of the present day read Kipling. Certainly, the last two wars and the difficult age through which we are living have shown the clay feet of his idol of subordination and efficiency. Nevertheless, there is one tale which he devotes to the glorification of this idol which is very relevant to this point. It is called, "The Ship that Found Itself," and it is included in the collection of short stories known as *The Day's Work*. It is an allegory in which a newly launched freighter puts to sea, and the various rivets, stringers, engines, and so on, converse with one another about the dangers they are facing. The ship comes successfully through a stormy voyage, and all of these conflicting voices are replaced by a single voice: the voice of the ship. The important thing for our purposes is that the voice of the ship is vested in the ship as a whole, and is not located in any particular member or members of its structure.

But I do not need to go to popular literature to illustrate the concept that organization belongs to a structure as a whole rather than to any specific member. In physiology this notion may have been affirmed by many writers; but it seems fairest to attribute a true recognition of its importance to Claude Bernard. The word in which Claude Bernard's notions are crystallized is *homeostasis*.

It is a truism of medicine that the conditions under which human life is possible are very narrow and stringent. A matter of ten degrees Fahrenheit is the whole range between a serious peril of undercooling and a dangerous fever. A deprivation of oxygen for a very few minutes will deprive a patient of all hope of ever resuming a normal cerebral function; and if it does not kill him, will decerebrate him and reduce him to the level of a hopeless idiot. There are many chemical substances in the body which must be held within quite narrow limits for continued life to be possible. These limits cannot be left to the accident of the environment if the individual is to live.

For each of these and in fact for all of these

in conjunction there must be an effective mechanism such that any serious departure from the normal initiates a process tending to bring conditions back to normal. The name chosen for the process is homeostasis. This homeostasis is not confined to any one locus or to any small number of loci in the organism, but belongs to the latter as a whole. The organism may regulate its temperature with particular reference to certain temperature-perceiving elements, but it is these temperature-perceiving elements together with chemical or nervous-transmitting elements and temperature-changing effectors which constitute the regulatory system of the human being; and these various elements need not be in spatial proximity to one another.

Regulatory mechanisms are not the peculiar prerogative of living matter. The ordinary domestic thermostat is an example of an artificial regulatory mechanism. The little element one sees in the wall is nothing but the sensory element of this mechanism: a metal piece made of two components with different coefficients of thermal expansion, which bends under the influence of changes of temperature in such a way as to make or break an electric circuit. This circuit turns the combustion element in the furnace off and on in such a way as to counter the changes shown in the thermostat. The control of the system is vested in thermostat, electrical connection, and combustion element, and cannot be localized in any one of them separately.

Homeostatic control is not confined in us to the regulation of what are ordinarily known as vital functions. Our posture in standing erect or our gait in walking are regulated by similar mechanisms, in all of which an incipient failure in performance tends to cancel itself. Such mechanisms are known as negative feedback mechanisms: negative because they tend to produce an effect cancelling an original error in performance. If I stand up and begin to fall forward, the kinesthetic sensation caused by the stretching of my calf muscles starts a reflex which contracts them and pulls me erect. Actually, the process is much more complicated than this; but the net effect is that one's equilibrium of posture is the result of a continuous tendency to fall over in a direction opposite to that in which one has been previously falling. It is this dynamic stability as contrasted with the static stability which makes it so hard to push over a living man as compared with a corpse or a statue with the same distribution of weight.

These self-regulatory functions of the living organism go far beyond the gross maintenance of temperature and of equilibrium. The modern biochemist is familiar with the concept of enzyme change, in which each chemical reaction controlled by a catalyst leads into another chemical reaction and so on, until the cycle of life is complete. It is indeed familiar to us that many of the most poisonous substances are those which so modify the enzyme change that it starts in a normal enough way, but arrives at a dead end from which no continuation of the process is possible. The worst poisons are those which are but slightly different from the substances entering into normal life processes.

This concept of chains of processes which are ultimately of a circular nature will apply to the actions of other substances besides enzymes in the strict sense. It will apply also to hormone chains. It may even apply to processes which are not strictly confined to a single living organism at all; as, for example, to the balance between an organism and its bacterial flora. In short, the concept of the negative feedback is almost ubiquitous in physiology.

A concept which is so important in physiology is bound to have its repercussions in pathology as well. When the heating of the house goes wrong, the source of the trouble does not always lie in the furnace: it may lie in the thermostatic system. We frequently have an example of this in my own house, in which the controlling thermometer of the thermostat is placed in a big livingroom containing a fireplace. When we light this fireplace, it warms up the room and makes the thermometer rise. This rising thermometer in its turn extinguishes the furnace and cools the rest of the house.

If we wish to avoid this, we must compensate for this effect by turning up the setting of the thermostat to an abnormally high level.

This is, perhaps, one of the simplest ways in which a homeostatic process can go wrong. The control engineer is, to his grief, familiar with very many others. The thermostat may not function at all, or it may function at a wrong constant level, or it may function with a drift of its zero point. It may go into uncontrollable oscillations, and actually destabilize the heating system instead of stabilizing it. All these defects of performance produce very specific and recognizable results which the repair man or designer must take into consideration.

If the breakdown of regulatory systems plays an important part in pathology—and I think it does—the pathologist of the future must be prepared to identify the symptoms of such a breakdown, and even the symptoms of the specific ways in which such a system can break down. There is one particular instance of this of which I wish to tell you, rather for purposes of suggestion than with any dogmatism. It concerns leukemia, and is reported in a paper written jointly by Dr. Paul F. Hahn of the Meharry Medical College and myself.*

As you all know, leukemia is a disease in which the number of white corpuscles of the blood, or at least the number of white corpuscles of certain types, grows inordinately. It is a disease with a mortality not far from one hundred per cent, and has been considered to be a sort of cancer of the blood. It is not perfectly clear whether the inordinate multiplication of white corpuscles is the fundamental lesion of the disease itself, or merely a symptom of a more complicated underlying condition. We present the following considerations to indicate that we incline to the latter point of view, and that an important part of the disease is a rather complicated breakdown in a homeostatic mechanism.

The increase in the blood content of white cells in the case of leukemia is fairly rapid, but quite regular and steady over a considerable period of time. It does not seem to compare for speed with the normal process by which white cells are formed, nor with the other parallel process by which they are destroyed, even in the normal subject. Thus, we have a relatively slow and regular process as the difference between two much more rapid processes. If these rapid processes were truly independent of each other, and there were no functioning regulatory mechanism, we should expect the balance between them to show great fluctuations. In a shop in which there is no close tie between expenditures and intake, even though the profit over a year is fairly definite and predictable, the daily balance will oscillate widely between the red and the black. Thus the regularity of progress of the white cell count of the patient with leukemia is a fair index that cell production and cell destruction are still connected by a regulatory mechanism, although this mechanism shows a drift. Thus leukemia seems to be much deeper in its etiology than a mere uncontrolled increase in the white cell count. It is a disease, at least in part, of the homeostatic mechanism itself, and the white cell increase may be only a symptom, although a serious and dangerous symptom, of a process whose essential nature is quite different.

This seems to be quite in accordance with the known fact that if means such as irradiation are used to bring down the white cell count, and if we plot the white cell count on semi-logarithmic graph paper against the time, then if we take the parts of the graph between irradiation and place them end to end, the curve we obtain is not very greatly modified by the irradiation. This is probably not irrelevant to the fact that treatment to reduce the white cell count does seem to prolong the life of the patient for a much greater period than that during which the irradiative treatment is actually administered.

It will, perhaps, be interesting to the medical student to realize that there is an art of diagnosing graphs by which their inner dynamics may be determined. This diagnosis does not

* To my knowledge, this paper has not yet been published.

yet form a part of the normal medical instruction, even of the specialist. For this I blame no one, particularly in view of the excessive fraction of one's life taken by a medical course and of the great expense of a medical education. Yet I must reluctantly admit that this is only one of the places where the medical man is definitely backwards in the understanding and use of the mathematical tools which he most repeatedly needs.

Let me mention another example to illustrate this. We have excellent courses on mathematical epidemiology in connection with our public health work. Yet, the average paper which appears in our medical journals is characterized by a childishness in statistical techniques which is simply ridiculous and inexcusable. A new disease is first recognized in those cases in which it is fatal or at least seriously disabling. It is thus given a high rate of mortality. Later on, improved techniques of diagnosis identify the same pathological process at a much earlier stage. It is found that most of these newly identified cases are relatively mild, and the mortality rate drops sharply. "Aha," says the author of a paper, "see how effective my therapeutic measures have been!" A new drug goes on the market, and it may take ten years to evaluate its true effectiveness, and perhaps to find that it hasn't any.

Somewhere in the great complex of medicine there should be a niche for the man with medical understanding whose talents are primarily mathematical and physical. Whether he should be an M.D. or not, I do not know. If we are to add to the five years of training for the conventional M.D. the three or four years which represent about the minimum necessary for professional competence in mathematics and electronics, we shall have the best part of a man's productive life gone before he is ready to practice his profession. The rewards of such a career are so scanty as to make this self-sacrifice impossible for all except the most devoted. On the other hand, it is familiar to all of us that the non-M.D. around a hospital is an untouchable. He must bow and scrape for every vestige of authority to his qualified colleagues. I therefore do not wish to give a snap judgment as to whether this new career of mathematical-physical medicine should take its place within the existing frame of medical training or outside it and parallel to it.

I can give several examples where a man with this sort of training could make himself supremely useful. The problem of aids for the deaf and the blind requires a simultaneous understanding of the technical possibilities of telephone, television, and other similar pieces of apparatus, and of the channels by which sensory information is carried to the brain, stored there, and worked up for later application. Again, if normal standing and walking are feedback processes with a kinesthetic feedback, so are standing and walking with an artificial leg; and it may be possible to improve these prosthetic processes, not only by improving the mechanical possibilities of motion, but also by carrying to the uninjured parts of the organism an enriched body of sensations of position and motion, as for example by the use of strain gauges in the artificial knee and ankle, actuating vibrators registering on the normal skin.

This is one form of artificial feedback, and may be considered in an extended sense as a sort of artificial homeostasis. We have come, however, to a period of medicine in which artificial homeostasis in a more classical sense is just coming into use. A doctor at the Mayo Clinic, Dr. Reginald Bickford, has recently devised an artificial homeostasis for the administration of anesthesis; and his apparatus has been duplicated and improved by himself and by others. I, myself, have seen such an apparatus for animal anesthesia used by Dr. Verceanu at the Cushing Hospital in Framingham, Mass. The general idea is this: the total amount of electrical activity in the brain as indicated by the electroencephalogram goes up and down with the level of consciousness. This electrical activity may be collected by appropriate electrodes, amplified, and used to actuate an apparatus which will inject the anesthetic either into the veins of the patient or into a respirator, according to the nature of the an-

esthetic. These injections will be made when a certain total quantity of recorded cerebral activity has passed through the apparatus. In this way, a fairly constant level of anesthesia has been held for four hours. Thus, an anesthetist using this apparatus as an auxiliary can devote more of his attention to the heart action of the patient and to critical indications other than those of the depth of anesthesia itself.

It will be seen that this concept of artificial homeostasis is applicable in many cases besides that of anesthesia. Let us suppose that we have a patient in a critical condition in whom it is necessary to administer a drug in small continuous doses, monitoring these doses through some definite symptom capable of objective recognition through a registering apparatus. Without being too specific, let us consider a drug to be administered in a cardiac emergency, where some recognizable features of the electrocardiogram give the indication as to whether the drug is being received in the proper amount. I see no reason why an automatic homeostatic apparatus should not be used in such a case; and I have heard rumors of actual developments along these lines.

In the first instance such medication is likely to be confined to bedridden patients, as only in those cases is it convenient to encumber the patient with the necessary bulk of apparatus. Yet there are many cases where automatic medication of ambulant patients, although difficult to achieve, would be highly desirable. Let us take a patient such as a diabetic, who is dependent for his continued existence on the accurately gauged administration of a hormone or other drug. In the healthy individual, his insulin is released into his blood by a self-regulatory mechanism of which he never thinks. The diabetic must steer a narrow course between the Scylla of diabetic coma and the Charybdis of insulin shock. He does this according to a remembered code; and even though this code has come to be almost a part of him, it may be thrown out of kilter by an unusual exertion or an unaccustomed object of diet. The present more slowly soluble forms of insulin have greatly bettered his lot, but he still should carry with him a hypodermic syringe of insulin and a few glucose tablets to head off a catastrophe which may come from either direction. The problem of replacing this situation by an artificial homeostasis is certainly difficult, but it is not necessarily insoluble.

I thus present to you a few new vistas of what we may call mathematical medicine, which some of you may find interesting as an object of your studies. I do not urge any man to go into the field who has not firm qualifications, both of a mathematical and of a medical nature. There are no easy careers open in the field. However, to such of you as have the courage and the qualifications to undertake the forbidding work involved in a career in this field, I stand ready to offer help with advice and criticism.

The Doctor of the Future*

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IN THE mountain country they say that only fools and newcomers try to prophesy the weather. It seems equally foolhardy to forecast what kind or type of man will be the physician of the future. For this involves the economic, social, and environmental setting in which he will live and work, the changes in medical knowledge which will occur, the shifts in the patterns of illness in the population, and the evolutionary directions of medical education and practice which lie ahead. The only thing of which we can be certain in this time of transition is the certainty of change.

To lessen the risks of self-exposure, I shall take a relatively short-range view of the future, projecting trends which now seem visible, and I have chosen to present my views in this City of Brotherly Love in the hope of more charitable judgment upon my efforts.

I have mentioned first the economic, social, and environmental setting, since in every age and in every country medicine is congruous with the type of civilization of which it is a part.

During the past half century, medicine has contributed greatly to human health and progress; the increase of life expectancy at birth between 1900 and 1950 has added twenty years to the average productive span of life. It has transformed our civilization no less than have the better publicized developments in the physical sciences and their wide application by industry. Parenthetically, it should be recalled that the health sciences during the same half century have been less successful in extending the life span after age sixty, the gain in life expectancy being only eight-tenths of a year.

Any forecast of the future must be based on the assumption that we shall not have a third world war. Assuming a world in which the cold wars are kept within room temperature and the hot wars continue to be limited, the future should bring higher standards of living among all people. In our own country we are likely to have shorter hours of labor, as well as more opportunities for recreation and for the enjoyment of the good things of life. Since the population as a whole grows more health conscious decade by decade, there will be a greater demand for health and medical services and greater average ability to pay for it. This demand will increase because the health sciences will have more to offer than now in the prevention and cure of illness and in the promotion of physical and mental well-being.

Dr. Richard H. Shryock has contrasted "The American Physician in 1846 and 1946," drawing attention to the great changes for the better in his status during this period in which "medicine has progressed from impotence to efficiency" (1).

In the eyes of others, however, our status as American physicians is not yet all that might be desired. I remember that in 1926 I was the guest of Doctor Lunsgaard, Professor of Experimental Medicine in the University of Copenhagen, who had then been newly appointed to the chair after several years of postgraduate study in the United States, most of it in Philadelphia.

I asked him what he thought of medicine in the United States and whether he had at any time considered the possibility of staying in this country. He replied: "Your medical science is moving ahead rapidly. It has a great future. But," he continued, "your country does not treat your doctors well enough. It is the bankers and industrial magnates and movie heroes whom you honor, both with

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money and prestige. Here in Denmark no one is rich; but our doctors, especially our Professor-doctors, are as well off and as well thought of as anyone."

Every individual from the beginning of time has been concerned for his own life and health. To mankind's age-long struggle for survival there has been added what Sir Arthur Newsholme has termed, "the sentiment against suffering." He says, "twinges of conscience have been the greatest antiseptic of our time . . . avoidable suffering is repugnant to national sentiment" (2). We can accept this for western civilization. There are no signs of it behind the iron curtain in Europe or Asia.

To this humanitarian incentive Dr. René Sand adds an economic motive, "Governments, formerly wasteful of human life, are led to economize and cultivate this living capital. Century-old evils which corrupt and destroy it—disease, poverty, ignorance and neglect—are no longer dealt with solely on a humanitarian basis, as the cause of sufferings from which we should spare our fellows, but also on an *economic* basis, as a waste and confusion unworthy of good management" (3).

A third motivation for measures to control disease lies in the powerful compulsion of fear. Shryock suggests that a monument should be erected in the United States to the *Aedes egypti* mosquito, since epidemics of yellow fever during the last century did so much to promote the organization of public health services.

Finally, there is the struggle to promote national strength epitomized in the slogan of World War II: "Let's make our men as fit as our machines."

These four motivations—the humanitarian instinct, the realization of the economic values of health, the fear of disease both by the individual and the community, and the patriotic desire to develop a body of manpower for resisting aggression,—their cumulative impact suggests the probability of substantial future legislation, national and local, in many areas of health and social welfare.

The form which such legislation will take is impossible to forecast. But if you accept my earlier thesis that medicine conforms to the social pattern of which it is a part—and this statement is based on the studies of our greatest medical historians—I venture the prediction that in health and medical policy we shall have a free competitive system paralleling our free competitive economic system. One should recall, however, that our economic system of today is quite different from the untrammeled monopolism of the past century. Likewise, the current governmental participation in public health programs, as well as in medical research of universities and other institutions, was unthought of during the past century.

As regards our future physical environment we can expect greater attention to city planning, to better housing, to conservation of natural resources, to alleviating the pollution of our air and our waterways, and to the greater development and more intelligent use of recreational facilities.

The body of medical knowledge will continue to grow but new problems of illness will replace our battles against the plagues which have concerned us in the past. The major communicable diseases will continue to decrease in importance. The tuberculosis death rate in this country, for example, declined by 41 per cent in only five years between 1945 and 1950. It is now less than twenty per 100,000 of the population; in 1930 it was seventy-one per 100,000 (4). Syphilis is no longer a major public health problem. It will continue to decline if public health efforts are concentrated upon those population groups in which there is the greatest prevalence. Deaths from pneumonia have declined greatly due to modern methods of chemotherapy. Recent experiments in the prevention of poliomyelitis hold real promise for a practicable method of preventing this disease within a relatively short time.

While the communicable diseases will be of relatively little importance in the measurable future, in my opinion most of them now prevailing will not be eradicated. You all know that it is very difficult to exterminate a biological species. Already strains of microorganisms have appeared which are resistant to

formerly effective chemotherapy. I see a continuing struggle between scientists attempting to develop new chemotherapeutic weapons and increasingly resistant mutations of organisms and insects which they were designed to kill.

It is common knowledge that the average age of the population will continue to increase. By 1975 the population of the United States aged 65 years and over is estimated to approximate 21 million persons, a 69 per cent increase from 1950 when this same age group numbered 12,321,000 (5).

This great increase in older persons will pose important economic as well as medical problems, as was pointed out by a Committee of our Pittsburgh faculty at a National Conference at Arden House in January 1952 (6). The problems will be aggravated unless the current trend towards a fixed retirement at age 65 is reversed.

This shift in the age distribution of the population will bring both an actual and relative increase in the degenerative diseases. However, the many pathological conditions now lumped together as "degenerative" are increasingly being sorted out. Some of them undoubtedly are the sequelae of earlier physiological insults—such as infections, toxemias, chemical poisons, or nutritional deficiencies—rather than the result of the aging process itself. In fact, our concepts of aging will alter as our knowledge of metabolism increases. In measuring the physical and mental status of an aged individual today it is impossible to apportion precisely that part of the existing pathology due to the insults of earlier years and that which is due to the normal process of senescence.

Scientific knowledge will grow apace, especially in the laboratory sciences such as biochemistry, physiology, immunology, and all of the disciplines involved in the study of the intricate and interrelated roles played by vitamins, hormones, and enzymes in cellular metabolism.

Knowledge of the man-environmental relations likewise will grow but at a slower rate, since fewer scientists are working in these fields, since such research is expensive, and since the problems are of great complexity. The study of the dynamics of man's interaction with the many and complex variables in his environment (physical, biological, and social) is a promising but largely untilled field. Hence, human ecology is emerging as a field of study for the life sciences. It is an area in which schools of public health already are playing an important part.

The natural history of disease and of health among a representative population group of known characteristics is one aspect of ecology on which our public health faculty in Pittsburgh has begun a long-term study. In the future such a population group, such a bio-socio-statistical laboratory, of which ours is the fourth in the country, will be considered as essential for medical and health research and teaching as are the clinical wards, the metabolism beds and the biochemical or the microbiological laboratories in medical centers of today.

During World War II great impetus was given to a new field of endeavor called human engineering. In its simplest form this involves improvement in the design of machines better to adapt them to the physiological and psychological capabilities and limitations of the operator. Related to this development is the field of environmental physiology, a study of the human response to environmental stress and the translation of the findings into engineering terms, applicable alike to military or industrial situations.

Industrialization will increase, and there will be a growing awareness on the part of management and labor that the health sciences can contribute to production by promoting the health, morale and efficiency of workers. This will require a trained group: physician, engineer, toxicologist, psychologist, dentist, and nurse.

As I have already pointed out, we have acquired a large body of knowledge and have applied much of it for the control of disease and premature death. Yet we have not even begun to understand the problems of repro-

duction in man, nor the factors—biological, physiological and psychological—which are associated with human reproduction. Serious pressures of population have developed in many areas of the earth where advances in technology have reduced the death rates but have not developed food and other resources at the same time. Here is another field for medical science to explore.

Genetics is a relatively new field of science which holds great potentialities for the future of plant, animal and human species.

Simply because mental and emotional illness has a higher incidence in the older age groups, they will become of increasing importance to the physician of the future even if the attack rate age-by-age does not increase. I believe, moreover, that more attention will be paid to the biological bases of mental illness. One has only to read the recent publication of the Milbank Memorial Fund under this title to see the great, untouched opportunities (7).

Cancer stands in a class by itself. While our knowledge of the factors causing this disease or group of diseases is growing rapidly, no one can foretell how soon effective methods of prevention and more effective methods of treatment will be discovered.

The patterns of medical practice inevitably will begin to keep pace with medical knowledge and social responsibility.

A large proportion of the population already has some type of insurance protection against costs of medical and/or hospital care. Prepayment of medical care will continue to grow rapidly both as to the numbers of persons covered and in the extent of the coverage. Whether this will continue on an entirely voluntary basis, I do not venture to predict. As a matter of fact, I have studied some systems of medical insurance, particularly in the Scandinavian countries, where it was difficult to decide in practice whether the system was "voluntary" or "voluntarily compulsive."

It does seem inevitable, however, that medical practice in the future will change rapidly from individual to group practice. This subject was discussed here in 1950 by Dr. George Baehr under the title, "The Role of Medical Group Practice in the Changing Order" (8).

The wide implications of medical insurance are discussed in the "Report of the Dean of the Faculty of Medicine" (of Columbia University, 1952):

> The continuing expansion of voluntary medical insurance plans needs only be cited to illustrate the extent to which these developments may influence medical practice, hospital services, and, indirectly or even directly, medical faculties and medical education. There are about eighty-six million individuals who have varying degrees of protection against hospital expenses. The number has increased about seventy million in the last ten years. The establishment of such a large proportion of the population of the nation on some form of prepayment hospital insurance, whether complete or only partial, suggests the magnitude of the influence of that development upon hospital and medical practice.

A system of prepayment of medical care and of group practice whereby groups of physicians and ancillary personnel will have a total responsibility for the total health of groups of families seems to me clearly indicated. To be most effective, such a system must provide an economic incentive to keep people well. In the long run, as in the case of the Health Insurance Plan of Greater New York and the Permanente Plan in California, it may mean a capitation system of payment instead of fees for service. In that event, many of the personal health services, including immunization, prenatal and well-baby clinics, nutrition clinics and the like, will be added to the responsibility of the family physician supported by the pediatrician or other specialist working together in a group. During the past decades these personal health services have been rendered, to a large extent, by public health departments. They have filled a vacuum which in the future,—how soon, I would not guess—should become a part of the compre-

hensive but personalized program of health care rendered by the private physician.

In the interest of professional efficiency, patients increasingly will come to the medical groups of the future which will be located in or adjacent to the hospitals in which they do their work. The physician, medical social worker or nurse will visit the patients' homes whenever the skills of any can be used best to give help or to understand the total environment. There will, however, be far greater use than now of ancillary personnel in order to conserve the time and skill of too few physicians.

Our present haphazard location of hospitals and their lack of co-ordination with one another and with the needs of the community will evolve into a more rational and utilitarian system. Such a system was forecast in the "Report of the Commission on Hospitals" under the chairmanship of the late President Thomas S. Gates of the University of Pennsylvania, in a study directed by Dr. Arthur Bachmeyer of the University of Chicago. The major elements of such a co-ordinated hospital system were approved as national policy in the Hospital Survey and Construction (Hill-Burton) Act of 1946. Already a substantial number of medical centers are assuming responsibility throughout their natural geographic area in offering consultation services, in conducting postgraduate and continuing education, in providing internes and residents to peripheral hospitals, in improving the quality of the pathological service, of hospital administration, and of other aspects of care in affiliated and peripheral institutions.

The function of the hospital is expanding to include programs of home care which not only reduce the need for hospital beds, lower the cost of illness and provide the patients with more normal surroundings, but which give the physician further insight into the home conditions which bear upon the progress of the patient or, indeed, upon the origins of his malady.

No discussion of the physician of the future would be complete without considering the medical education which makes him what he is. As a result of growing dissatisfaction with present medical curricula, a comprehensive three-year study currently is being made, stretching almost from the cradle to the grave of the practitioner. The subject has been dealt with in competent fashion in the New York Academy of Medicine series by Dr. Raymond Allen ("Medical Education in the Changing Order," 1946). Last spring the teaching of psychiatry in medical schools was the subject of scrutiny at a conference in Ithaca, and currently the neglected field of preventive medicine is the object of intensive study, the conclusions of which are being presented at Colorado Springs later this week.

Meanwhile, revisions of medical curricula are underway in many centers. Some with which I have become familiar include Pennsylvania, Western Reserve, Colorado, and Long Island. No two are alike either in method or content, yet I sense some common objectives, designed to correct defects in current medical teaching such as: too much preoccupation with disease entities; lack of interest in environmental factors in health and disease; too much concentration upon the patient in a hospital bed presenting a rare and baffling diagnostic problem; too little concern with training the doctor as a member of a coordinated health team; indifference to the study of health and the prevention of disease; lack of attention to rehabilitation as a medical responsibility; the "monistic" rather than the "multi-dimensioned" approach of many teachers, whereby over-simplified categories of "cause and effect" exclude the social and emotional factors of disease.

At the University of Pennsylvania, Dr. John Hubbard has introduced into the undergraduate medical curriculum a four-year program in preventive medicine and public health. In his words, "It is no longer enough to describe him (the doctor) as the healer of the sick; he is to an increasing degree the protector of the well, concerned with the health of the community in which he practices. . . . Public Health can only be taught by utilizing the

community as the laboratory in just as real a sense as the dissecting room is the laboratory of the department of anatomy" (9).

Dr. Ward Darley, at the University of Colorado, believes that from his first day in medical school the altruistic and humanistic interests which the student brings to his professional education should be cultivated. On this point, Dr. Willard Rappleye told an audience in Philadelphia two years ago, "It is unfortunately true that many students have a better social motivation when they enter medical school than when they graduate" (10). The cultivation of these humanistic interests, Dr. Darley believes, requires from the start personal experience with human beings and their problems, the study of man in his totality, constantly interacting with his environment. Human development, behavior, adaptation and the nature of human personality are concepts which the student should understand. These concepts, he concedes, are not so easy to teach as are the traditional courses in structure, function and development of tissues, organs and systems of the human body (11).

At Western Reserve a central purpose of the new program is to learn medicine as an intelligible whole. This has involved breaking down departmental barriers for teaching purposes. For example, a femur or a kidney is discussed by instructors from several departments as regards its structure, gross and microscopic, its functions and dysfunction, its reaction to disease (its pathology), and its relationships with other organs or tissues. How the walls between the several departments must be shaken asunder in order to accomplish this objective! Dean Wearn and Dr. Ham have the courage and fortitude required of pioneers.

Current developments in medical education while they appear to be revolutionary are, in effect, counter-revolutionary. They represent a radical or a gradual reversion to certain ancient principles, with necessary adaptations of method to meet present and future needs.

In the Greek civilization the physician or doctor was first of all a philosopher, a student of natural phenomena; his conclusions about health and disease were secondary interests. While today no one would wish to return precisely to such methods as the Greeks employed, we have much to learn from them; especially about the art of medicine and the underlying philosophy of health and disease.

To quote from the Syntopicon of "The Great Books" series:

"It is a curious accident that the word 'doctor,' which in origin signified the competence to teach others who might practice in each of these great fields of learning (law, medicine and theology), has come in popular usage to designate, not the teacher, but the practitioner, and chiefly the practitioner in only one of the learned professions. Medicine may not deserve the implied emphasis upon the learning of its practitioners, but there would be some truth in granting it the distinction of being the oldest of the professions in the sense that it comprises a group of men who not only share a common training in the relevant sciences and arts, but who also have adopted a code of practice and obligated themselves to perform a service to their fellow men.

"More than engineering or the invention of mechanical utilities, medicine represents knowledge in the service of mankind. That science shall bear fruit in technology 'is . . . to be desired,' writes Descartes, . . . 'principally because it brings about the preservation of health, which is without doubt the chief blessing and the foundation of all other blessings in this life. It is true that the medicine which is now in vogue contains little of which the utility is remarkable; but, without any intention of decrying it, I am sure that there is no one, even among those who make its study a profession, who does not confess that all that men know is almost nothing in comparison with what remains to be known.'

"The subsequent history of medicine, some of the great documents under the names of Jenner, Bichat, Virchow, Claude Bernard, and Koch, seems to substantiate Descartes' prophecy. But it also seems to be true that the major problems of medical practice are not greatly altered or diminished by the tremen-

dous increase in our knowledge of the causes of specific diseases and our vast store of well tested remedies.

"What sort of art medicine is; to what extent the physician should let nature run its course; with what restraint or prudence the physician should apply general rules to particular cases; whether health is better served by the general practitioner treating the whole man or by a specialist treating a special organ; how the relation of the physician to his patient is itself a therapeutic factor and underlies the effectiveness of his skill in all other respects; to what extent mind and body interact both in the origin and in the cure of disease—these are the problems of medicine concerning which Hippocrates and Galen can converse with Osler and Freud almost as contemporaries.

"The art of medicine does not produce health in the sense in which the shoemaker produces a shoe, or the sculptor a statue. These other arts imitate nature by embodying natural forms or functions in materials wherein they do not naturally arise. An art like medicine seems to imitate nature by cooperating with natural processes. It follows the course of nature itself and, by working with it, enables the natural result to eventuate more surely than it might if art made no attempt to overcome the factors of chance."

The 1951 Annual Report of the Commonwealth Fund comments upon current shortcomings in medical education in these terms: "Medical Schools must teach something more than technology." Then it is asked: What is this "something more" and how to provide it? Not having the answers to these questions the Fund is supporting a dozen experiments which it hopes will provide some of the answers. "More of its grants than ever before [are going] into experiments in this field." The objectives and the experiments are clearly defined and should be read in the original Report. I quote, however, one brief statement:

"Many college graduates bring with them to medical school good marks in history, chemistry, and physics. But few bring an understanding of the society in which the doctor functions, or of what doctoring really means."

The need for a physician to be a learned man, not merely a skilled technician recently has been well stated by Dr. D. C. Elkin in his Presidential address before the American Surgical Association this year, entitled, "A Case for the Study of the Humanities in the Making of a Doctor."

"We have emphasized the sciences," says Elkin, "for 'premedical' students to the detriment of their education" (12).

The total spectrum of the science and art of medical teaching today should embrace as a minimum equal emphasis upon the prevention, diagnosis, treatment and rehabilitation of disease.

Medical education and medical practice during my professional career have been preoccupied with *diagnosis* and *treatment* in the narrow sense; preoccupied with the rare, the unusual condition, giving little attention to *prevention* or *rehabilitation*.

More attention currently is being given to understanding the total individual and all of the environmental and social factors which bear upon illness and health. To this should be added a broad understanding of the patient as a member of a family group and of a working group which represent—together with church, lodge, club and other organizations—the social environment with which the individual is constantly interacting and which contributes greatly to his health or his lack of it.

There are obvious examples of cause and effect; but frequently the casual relationship is obscure or too complex to be readily evaluated. However, the physician must strive to know the individual and all of the relevant circumstances of his life.

As I have tried to indicate earlier, there is an historical continuity of medical thought about the nature of health and of disease beyond the concept of etiology—the predisposing and exciting causes—and beyond the characteristic symptom complex. The question as to what is disease, or what is health has been the subject of speculative interest through the ages. The answers have a certain uniformity. The four elements or humors as conceived by Hippocrates, today are described as hormones,

enzymes and biochemical reactions. "Constant throughout these changing formulations is the conception of health as an equilibrium, and of disease as its loss through disorder or disproportion."

It is to be hoped that we now are educating some doctors of the future who will continue "The Great Conversation" begun by Hippocrates, Plato, and Galen.

You have observed, no doubt, that in the earlier portion of these remarks I have indulged in speculation as to the extrinsic factors which inevitably will mold the physician of the future. An over-simplified summary of these extrinsic factors would include 1) the greater demand for medical services; 2) the changing nature of disease problems; 3) the widening horizon of medical knowledge plus the inclusion of such skills as that of the psychologist, the sociologist and other ancillaries in diagnosis and treatment of disease; 4) the additional emphasis upon prevention and rehabilitation along with the de-emphasis of "museum medicine"; 5) the change in the techniques of medical practice.

In this latter portion of my discourse, however, I have veered toward a discussion of what the physician of the future should be; to paraphrase St. Paul—the substance of things hoped for and the evidence of things yet dimly seen.

It is my conviction that if the profession of medicine takes cognizance of itself and lives up to the potentialities of the present, the physician of the future will rank higher in the American polity than he does today. Specialized though he will be, it will not be the kind of specialization which knows more and more about less and less. He will be, I hope, more learned than are the majority of us before he acquires his medical skills. He will be more directly motivated to keep abreast of the world he lives in. His special skills each will constitute an integral unit in the larger mosaic of human service.

By and large, as the wheel of compensation turns, a man's reward is determined by his service. Certainly his happiness is predicated upon it. I am convinced that a majority of the physicians of the future, rather than a small minority as at present, will rank with leaders of the states and the nation because of their contribution to the welfare of America in its most vital sector—the prevention of premature death and needless disability, the prolongation of productive and happy life. Perhaps Paracelsus, in the sixteenth century described as one whose "powers were not adequate for his desires" (13) expressed far better some of the things I have tried to say this evening. I quote:

"Woulds't thou be a master? First be a baccalaureate, then a doctor, then become an experienced and learned man. So can'st thou settle down to the benefit of the sick as a medical practitioner."

Paracelsus needs only one phrase to bring him up to date for the last half of the twentieth century. To benefit the sick is no longer a one-man job.

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Memoir of Charles-Francis Long*

By CARL BACHMAN

CHARLES-FRANCIS LONG, physician, keen student of industrial medicine and hygiene, and counselor to his community and state in problems of that field, died on February 28th, 1952 at the early age of fifty-four years.

Born in Wilkes-Barre, Pennsylvania, on March 1st, 1898, the son of Dr. Charles and Fannie Sax Long, he graduated from Haverford College with honors in 1918, and following an interlude of military service with the American Expeditionary Forces in France during World War I, acquired his M.D. degree with honors from the University of Pennsylvania in 1923.

He began the practice of medicine in 1925 as a junior associate of the late David Riesman. Simultaneously, he also accepted an invitation to direct the medical services of a large industrial firm in this city. Although successfully managing both of these endeavors, he found, in the problems of industrial medicine, a special interest that was destined to engage much of his talent for study and investigation throughout his career. His many published papers attest to the attraction which the field held for him. The respect with which his reports were received, moreover, led to increasing demands for his advice and cooperation in the councils of colleagues, and of officials of our community and commonwealth, and to these he responded unselfishly. The roll of his memberships in various professional, civic, state and national commissions and committees on problems of industrial hygiene provides impressive evidence of the respect accorded his authority and views. He was Chairman of the Commission on Industrial Health and Hygiene of the Medical Society of the State of Pennsylvania, and of the Industrial Medicine Commission of the Civil Defense Council of Philadelphia. He was also a member of the following committees and boards: The Committee on Public Health and Preventive Medicine of the Philadelphia County Medical Society; the Board of Directors of the Philadelphia Interstate Association of Industrial Medicine; the Advisory Committee of the Visiting Nurse Society of Philadelphia; the Safety Council of the Philadelphia Chamber of Commerce; and the Medical Advisory Committee of the National Association of Manufacturers. He was also (since 1940) Associate Professor of Industrial Health at the Woman's Medical College of Pennsylvania.

In 1925 Dr. Long married Hazel Aaron of this city, and their union was an exceptionally happy and felicitous one. Mrs. Long and their two sons, Dr. Charles Long II and David Long, survive him. As a devoted husband and father and a charming host to many friends of long standing, Dr. Long brought to his family and social life the same fine qualities of heart and mind that distinguished his professional activities.

By nature cheerful, warm, generous and loyal, he was also frank and courageous on issues of principle. His sense of responsibility in affairs of public service and trust was a truly dedicated one. It was characteristic of him, moreover, that he brought to such service a self-effacing attitude which left many of his very substantial achievements unknown to, and unrewarded by, his community except in the quiet recognition of their true worth by his co-workers and friends. All who were privileged to know him will remember him with enduring esteem and affection.

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The Philadelphia Medical Society, 1789–1868

By SAMUEL X RADBILL, M.D.
Fellow, College of Physicians of Philadelphia

ORIGIN

THE origin of the Philadelphia Medical Society was intimately bound up with affairs at the Medical School of the University of Pennsylvania in their most turbulent period. The Society emerged victorious in its earliest days from a contest with an older rival; for over half a century was an important instrument in the medical life of the city; finally succumbed, as it had been born, in another contest, this time with a younger rival, now the voice of almost all Philadelphia physicians—the Philadelphia County Medical Society.

As indicated above, the Philadelphia Medical Society was not the first medical society in the city. A society of the same name had been started in 1765 by Dr. John Morgan; but it lasted only three years, when through a series of mergers it became engrained in what is now the American Philosophical Society. Then, the existence, in 1767, of a Hospital Medical Society, composed of students at the Pennsylvania Hospital, is predicated by a presidential address contained in a notebook kept by John Archer—by alphabetic accident, the first medical graduate in this country (1).

The urge for a non-exclusive organization open to all interested in medical affairs evidently persisted. Such groups were active and increasing in number in the mother country, as we learn from the diary of Sylas Neville (2). Philadelphia medicine was very much under the influence of London and Edinburgh and it was only natural that a society should be formed here greatly imitative of similar organizations there. Accordingly, in 1770, a medical organization was founded in Philadelphia called the American Medical Society. It was organized by a number of students who had assembled in the city to hear the lectures of the medical professors, and who judged they might derive advantages from associating themselves in order to discuss various questions in the healing arts, and to communicate their observations on different subjects (3). This society consisted—as is frequently found in medical societies of the 18th and early 19th centuries—of senior members, who were graduated physicians with regularly awarded medical degrees, and junior members, who were studying medicine in the city. Dr. William Shippen, Jr., was president in 1790. The association met weekly, but only during the sessions of medical lectures, which ran from October to February (4). During the Revolutionary War, when classes were interrupted, it is probable that activities were frequently held in abeyance; but by the year of the formal close of the war, 1783, meetings had been resumed (5).

The fortunes of the medical school in Philadelphia for twenty years after the organization of the medical faculty in 1769 were checkered. During the war, especially, classes were disrupted, the College property was taken over at times by the military; after the war, the affairs of the institution were greatly interfered with by the newly constituted political authorities. One result of this was that for a while there were functioning two medical schools in the city with conflicting interests. It was in this disturbed period that the Philadelphia Medical Society was organized, in 1789.

There was at first bitter rivalry between the new society and the older American Medical Society. This is evidenced by the fact that the rules of the new organization specifically made it unlawful to admit as a junior member any such member of the older society; nor could any junior member of the Philadelphia Medical

Society, under penalty of a prodigious fine ($20), be proposed as a member of the American Medical Society.

When the two rival schools at the University were finally fused and their professors integrated into the one medical college, in 1791, there was no further need for two such medical associations. The American Medical Society yielded to its more youthful rival, passing out of existence in the following year. The College of Physicians of Philadelphia had also, of course, been founded in 1787, two years before the organization of the Philadelphia Medical Society; but the rather more exclusive nature of its organization and the prestige it acquired seem to have reserved for it from the beginning an uncontested place of its own.

ORGANIZATION

The Philadelphia Medical Society was organized in 1789. The minute books of the society from 1817 to 1826 are still in existence (6). A note under the date of November 13, 1824 states that the society was incorporated in 1783, but I think this was a mistake. Under the same date there is a statement that the early minutes and documents of the association had already been lost and a committee was authorized at that time to advertise for the missing papers.

A few months prior to the dissolution of the American Medical Society, the Philadelphia Medical Society was incorporated, June 2, 1792. The acts of incorporation and the by-laws were published February 6, 1793. In 1800 the society again published the acts of incorporation, listing the names of some 330 members. The acts of incorporation were then reprinted in 1804, 1806, 1811, 1817, 1824, 1827, 1832, 1836, 1840, 1843 and probably in other years at frequent intervals. When an attempt was made to re-awaken the society in 1858, the charter and by-laws were again reprinted.

These publications presented lists of members, senior, junior, and honorary, rules and regulations under which the society and its library were conducted, and other pertinent matters. Dr. Benjamin Rush was the first president and presided over the first meeting in 1789. He continued in the office of president until 1809. Among the honorary members listed in the first of these pamphlets were Rush, Wistar, Kuhn, Griffitts, and other members of the newly organized faculty of the University of Pennsylvania.

Stated meetings were to be held at 6 p.m. on Saturday of each week. They lasted from 6:10 p.m. to 10 p.m. The roll was called twice each evening: immediately after the president took his chair and immediately previous to adjournment. Any junior member residing in Philadelphia who failed to answer to his name was to be fined one-eighth of a dollar for each failure. At first, each member, according to seniority, had to read a dissertation on some medical subject, which was then discussed at an ensuing meeting, but this rule was abolished in 1817.

The rules for admission to the three classes of membership were fairly stringent, involving, in the case of junior membership, formal proposal, examination (in some cases, submission of a thesis), and balloting. Upon acceptance, junior members paid $5 and received a certificate giving them the right of admission to the sittings of the Society. Beginning with the session of 1824–25, the certificate was about the size of the ticket of admission to medical lectures then commonly in use. Beautifully engraved (by J. Perkins, about 1824), and signed by the president, the two vice-presidents, and one of the recording secretaries, this card exhibited Minerva, special tutelary deity of physicians, above the Society's motto, *ex collisione scintilla*. The motto ("a spark from friction"), adopted from the beginning, no doubt referred to the hope that rubbing shoulders with other members of the profession would prove stimulating.

Upon graduation from medical school each junior member automatically became a senior member. Practicing physicians (not always endowed then with a formal medical degree), and physicians who had received the degree,

were also, under certain regulations, admitted as senior members. All senior members could obtain, at the expense of seven shillings sixpence, a beautifully engraved diploma, with the Society's seal impressed in wax and suspended by a fine broad ribbon.

These diplomas may have been misleading at times, because in 1813 I find Dr. Benjamin Rush complaining that "In consequence of the diplomas of the Medical Society (which like the diplomas of the University are written in the Latin language) being subscribed by one of the medical professors as its president, three instances have been communicated to me of these having been imposed upon the public as diplomas from the University. It is probable similar frauds have been practised in the same way that have not as yet been detected. It belongs exclusively to the Trustees of the University to devise a method of preventing in future such fraudulent substitutes to the medical honors (7)". I do not know whether any action was taken in consequence of this remonstrance. Diplomas continued to be issued long afterwards.

The junior member might also aspire to promotion to honorary membership. If, after the requisite examinations, a favorable decision was reached, the candidate paid $20 to the treasurer and was furnished with a diploma signed by the president, the vice-president, and by the members of the special committee of examination.[1]

MEETING PLACES

The first meetings were held at a meeting hall at the southwest corner of Fifth and Arch Streets. How long they continued there I do not know, but in 1804, impressed with the advantage to be derived from having a permanent meeting place, it was resolved that one-half of the annual funds should be set aside as a building fund. Efforts to raise money apparently were insufficient to meet the needs for such a project. Although I have seen documents headed "Hall of the Philadelphia Medical Society", no permanent home appears ever to have been obtained.

Lyttle's Schoolhouse, on South Second St. below Spruce, seems to have been the next scene of action. Bills ordered to be paid indicate that the rooms of the Board of Health were used as a meeting place, 1817–19. Late in 1819, it was agreed to lease a hall from the Masonic Lodge for ten years at an annual rental of $300. For many years the meetings were held in the basement of this Masonic Hall at Seventh and Chestnut Sts. The minutes of the Society designated this auditorium as "Medical Hall, Philadelphia." To raise more money, the hall was sublet for meetings by other groups when the Society was not in session. In 1820, the newly formed Academy of Medicine agreed to pay $50 a year for use of the hall. The librarian was further authorized to advertise the medical hall in at least three daily newspapers as a suitable place for the meetings of societies and to demand one dollar for every meeting so held, with the addition of 50 cents if the Medical Society provided heat and light.

In 1839 the sessions were held in the hall of the College of Pharmacy on Zane (now Filbert) St. near 7th. On November 3, 1846, the College of Physicians granted the use of its "chamber" in the Mercantile Library to the Society for a special meeting the following Saturday evening (8). This must have been the final meeting place of the Society before it went into hibernation for twelve years. When revived in 1858, the meetings were held in the hall of the Locust Street Lyceum.

LIBRARY

The formation of a good medical library must have been in the minds of the founders of the society from its very inception. Books, especially medical books, were very costly in

[1] An interesting example of the close guardianship maintained over the honorary membership is furnished by the case of Governor (later, President) William H. Harrison. It will be recalled that Harrison had taken the regular course in medicine at the University of Pennsylvania, in 1791, but had failed to take the M.D. degree. He was proposed as an honorary member in December, 1817, but at the next meeting, on objections being raised, was declared ineligible.

those days, as they are now, but proportionately even more so then and reading the authoritative works was very important in the preparation for the practice of medicine. By 1817 the collection of books in the society library had already grown to considerable proportions. At the meeting of November 1, 1817, Dr. John Barnes on behalf of the committee appointed to carry into effect a plan previously proposed and adopted for the enlargement of the library reported that this was found to be impracticable. At the meeting on the following December 13th, a committee of three was appointed to make such an appropriation as the funds would permit for the purchase of the most valuable periodical works in Europe and the United States promoting medical science. Drs. Stewart, Barnes and Morgan were appointed to this committee. Thenceforth a librarian was always elected to care for the books, keep records of them and attend to their use by members of the society. Dr. George Tresse[2] was librarian for many years, starting in this office during his student years in medical school apparently. Later (1826), Dr. Alfred Drake assumed the burdens of the office.

At the meeting of December 2, 1820, a present of some books was received from Geoffroy Saint-Hilaire by the hands of a Mr. La Seur. This must have constituted a considerable addition to the property of the society. It was resolved that the library be moved to the medical hall and Drs. Jackson, Stewart and Barnes were continued as the library committee. It was also necessary to alter the laws of the society respecting the library and Drs. Condie, Povall and Harris were appointed a committee for this purpose. They reported the new regulations for the library at the following meeting which were adopted as follows:

"The library shall be open during the year in the afternoons of Wednesday and Saturday between the hours of five and six at which time the librarian shall attend to deliver books to the members on the following regulations: namely;

Section First: Every junior member wishing to procure books from the library shall deposit five dollars with the librarian which shall be returned to the same member provided the books received by him from the society be returned in good order within six weeks from the day it was loaned, the fines hereafter to be mentioned, being previously deducted.

Second: Promissory notes to the amount of $20.00 shall be received from resident physicians, honorary members in lieu of deposits of money.

Third: But one volume shall be loaned to one member at the same time except where a second may be considered necessary for the illustration by plans or plates of the first or in the case of duodecimo, where if the work consists of two volumes, both may be taken out. If the book be a duodecimo or a journal it must be returned within one week. If an octavo or quarto within two weeks from the time it was taken out.

Fourth: The librarian shall keep a list of the volumes or journals loaned together with the name of the persons to whom they were loaned noting also opposite to each volume or journal the date on which it was delivered from the library.

Five: Any member after returning a volume or journal at the specified time may have the same renewed provided no other person is an applicant for the same.

Sixth· If the members of different grades apply at the same time for the same book the junior member shall have the preference during the sessions of the society but the honorary member during the recess.

Seventh: In case of a volume not being returned within the time specified in Section 3, the following fines shall be incurred by the person so neglecting: 12½¢ the first week they are retained beyond the time; 25¢ for the second, etc., the amount being doubled for

[2] Also spelled "Treese", "Trees" and "Tress". Although I do not know when he received his M.D., the records do show that a George C. Tresse attended the School of Medicine at the University of Pennsylvania for one year ending in 1811.

every week until the end of the sixth when the volume, not being returned, the amount deposited by the person who borrowed the same shall be forfeited.

Eighth: A printed copy of the above regulations shall be pasted within the cover of each book belonging to the library of this society.

Ninth: At the last meeting of each session the librarian shall report to the society the number of books which have been loaned since the last session. A list of volumes which have not been returned and the amount of fines and forfeitures incurred which last he shall pay over to the treasurer and take a receipt for the same. Additional books procured by the library committee shall be immediately deposited with the librarian in default of which the committee shall incur the same fines as are mentioned in section 7."

At the session of 1822–23, G. B. Emerson, J. Randolph and J. M. Staughton were elected to the library committee. At the first meeting of the next session (1823–24), Dr. Tresse was authorized to remove the library to his residence at the beginning of the next session. This was again authorized and the librarian was also requested to make out an alphabetical catalogue of books belonging to the society. The bylaws of 1824 and after outlined the duties of the librarian and of the library committee. The librarian was chosen once a year. It was his duty to make out and keep a correct catalogue of the books of the library, alphabetically arranged both with respect to subject and names of authors. He was to be present during the specified hours during which the library was open to deliver books to the members according to the regulations. A report was required from him annually. For all this he was to receive the annual salary of $50. The library committee, elected annually by ballot from among the honorary members, determined the general regulations of the library, the purchasing of books, and assumed such other duties as were not assigned to the librarian. By 1835 public attention was being called to the fact that the society was in possession of a fine library embracing many valuable books (9).

Each book had a bookplate pasted into the front cover to mark its ownership by the Society. This was a printed label marked "The Philadelphia Medical Society" with a typographical border, a space for the catalogue number of the book and the old motto: *ex collisione scintilla.* The by-laws of 1858 stipulated that the library would be open every Saturday afternoon from 3:00 to 4:00 P.M. for the use of the members, who could borrow books for use at home for a limited period of time. In November 1846 when the society discontinued its activities, permission was granted to place its library in the chamber of the College of Physicians of Philadelphia and the College Library Committee was directed to have a case made, corresponding to those already in the chamber, for its reception (10). Two months later it was resolved that the books belonging to the Medical Society be entered upon the catalogues of the College library, with some appropriate marks after their titles, and Drs. Moore and Condie were added to the Library Committee of the College to assist in carrying the resolution into effect (11). In five months, the committee was able to report that the books had been properly taken care of and deposited in a case especially appropriated to that object. The key of this case remained with the College Library Committee and the books were available to the Fellows at the time of the meetings (12).

In 1859, during the attempt to reactivate the Society, the books were withdrawn from the College. What is taken to be a catalogue of these books,[3] evidently drawn up by Dr.

[3] The evidence on which the volume was so accessioned appears to consist of the following penciled note on a fly-leaf: "Is this a catalogue of the Books of the Phila Med Society which were deposited with the College. THB. May 12, 1871." The writer was probably Dr. Thomas Hewson Bache, librarian of the College, 1855–63. Presumably an affirmative answer to this question was available at the time the book was accessioned, or the unpunctuated question was construed as a simple declaration, which a transposition of the first two words would make it. Very little doubt concerning

Thomas Forrest Betton, who was president of the Society in 1854, was presented to the College of Physicians by Mr. Hugh Lenox Hodge and accessioned in 1896 (13). This catalogue is written in a beautiful hand, arranged in alphabetical order with running comments and notes, some taken from various bibliographies, some original by the writer. It is evident from the latest dates of entry that it was written about the year 1855 or 1856. Concerning a manuscript notebook which is listed of the lectures of Dr. B. S. Barton delivered in the University of Pennsylvania during the session of 1803–4, the author of the catalogue states that it was "Taken by my father, the late Sam'l. Betton, M.D." "The lecture notes delivered by Philip Syng Physick," also listed, are stated to have been "Taken in MS. by my late uncle, John Price Betton, Esq."

Concerning "Beaumont—Experiments and Observations on the Gastric Juice and the Physiology of Digestion, 1833", he says: "A very curious series of experiments made in the stomach of a living man afflicted with a fistulous orifice leading to that organ. The book has long since been out of print and is very scarce." About the Becks' "Medical Jurisprudence" he has this to say: "A masterly work. It is an imperishable monument to its authors and reflects high credit on their country."

After the final demise of the organization the residual funds of the society were turned over to the College of Physicians of Philadelphia. March 4, 1868, the Library Committee of the College ordered that the donation of $445.90 from the Philadelphia Medical Society be raised to an even $500 and that this money be invested so that the interest thereof could be applied in accordance with the condition of the gift to increase the library of the College (14). At a meeting of the College held Wednesday October 6, 1869, it was resolved that the accumulated interest of the trust fund be paid over to the Library Committee to be similarly applied (15). This fund is still in use.

PRESIDENTS OF THE SOCIETY

Benjamin Rush was the first president. He was re-elected year after year, until, in 1809, an idea arose that a professor should not occupy the chair, and Dr. Rush resigned. An address from the Society led to a change of view in the faculty, however, and *Dr. Benjamin Smith Barton*, another one of the medical school professors, consented to serve. He continued in the chair from February, 1809, until his death. Following his decease on December 19th, 1815, his nephew, Dr. W. P. C. Barton, read "A Biographical Sketch . . . Pursuant to Appointment, before the Philadelphia Medical Society, at a Stated Meeting on Saturday, 16th February, 1816, of Their Late President, Professor Barton" (16).

Dr. Nathaniel Chapman then succeeded Dr. Barton in the office of president in 1816, and served until February 12th, 1820, when he resigned. Upon his resignation, on motion of Dr. Jackson it was resolved:

"That impressed with a sense of the important benefits derived by this society from the useful merits and exertions of Dr. Chapman in maintaining its reputation by advancing its interests while officiating as president and feeling a deep sense of regret at the loss of his labor in that office, the thanks of the society be presented to Dr. Chapman for the ability with which he performed the duties of that office."

At the next meeting, a week later, *Dr. William P. Dewees* was elected, but he served only two sessions. In 1822, *Dr. Philip Syng Physick* succeeded to the chair and served uninterruptedly as president until his death in 1837.

In 1839 *Dr. Thomas Harris* was president. He was followed in 1843 by *Dr. R. M. Huston.*

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the catalogue would exist, were Dr. Betton's name not connected with it. He is recorded as having made two large gifts of books to the College library about this time: the first, in 1856, for which a catalogue still exists; the second, in 1863, when Dr. Bache was still librarian. No record of a catalogue of this second donation has been uncovered up to the present time. [Librarian's note.]

Others who later held the presidency were *Drs. T. F. Betton* and *René La Roche.*

In accordance with the by-laws of 1824, officers of the society had to be graduates in medicine as well as members of the society, except the recording secretary, who was to be a junior member of the society. When the vice-presidents and president were absent from the chair it was to be occupied by one of the chairmen elected by the society at the beginning of each session, or by a chairman, appointed if necessary, pro tempore. The presiding chairman was to be invested with all the authority of the president. He had to attend at the opening of each meeting during his month. In his absence, the chairman of the succeeding month was to preside. The recording secretary, in addition to keeping the minutes and lists of members, was given the duty of introducing new members. The curators, with the librarian *ex-officio* a member, took charge of and preserved for the use of the society all property of whatever kind, money excepted.

CHARACTER OF THE MEETINGS

While the meetings were formal, they were spirited and apt to wax hot and heavy. In those days the doctor took his medical beliefs seriously and defended them with the ardor of a religious fanatic. He loved those who believed with him, but woe betide those who disagreed. In the very early 1800's the Quaker City was the cultural and political center of the country, still the capital of the nation and its largest city. The Philadelphia Medical Society was at that time the open forum of expression, free to all comers and gave opportunity to those who were not of the elect to air their own medical erudition.

From time to time, committees were appointed to carry out investigations of various sorts. At the meeting of November 15, 1817, an experimenting committee found it necessary to ask for funds to defray the "expenses resulting from their experiments." In 1818, the profession was circularized concerning the formation of an American or National Pharmacopeia and the Society appointed a committee to consider the matter. This committee reported on December 19th, 1818, that in consideration of a similar communication having been previously officially made to the College of Physicians of Philadelphia who were engaged in replying thereto, it recommended to the society that notification of this circumstance be communicated to the committee in New York City from whom the circular letter was received and assign this as the reason for not taking any active part in relation to the object embraced in the letter.

The Society frequently placed notices of meetings, elections and other matters in the *Aurora*, one of the Philadelphia daily newspapers current at the time. The same paper in 1815 carried an advertisement giving a list of the officers, lectures and new members.

The *Public Ledger*, a daily newspaper, carried the Society's notices in later years and the Philadelphia County Medical Society is in possession of a holograph receipted bill for advertising weekly meetings of the Philadelphia Medical Society from January 1st, 1841 to March 27th of that year. The practice of issuing separate printed notices to each individual member was not known to the Society and of course, a separate roster of the city's medical meetings is only of comparatively recent origin having been instituted with the Philadelphia County Medical Society's *Weekly Roster* in 1905.

It may not be amiss at this point to quote verbatim a reminiscent account of the organization, as it was prior to 1822, written some years later by Dr. Thomas D. Mitchell (17):

"... Dr. Eberle had been a pretty regular attendant at the meetings of the Philadelphia Medical Society, in the business of which he took an active part. To those who have come on the stage of professional life since the palmy days when the Medical Society flourished, it may be proper to say, that the sessions of the Society were held in the same season with those of the medical department of the University of Pennsylvania, then the

only school of medicine in Philadelphia[4]. On Saturday, at half-past seven P.M., the hall of the Society, which for several years was in the basement of the Masonic edifice on Chestnut Street, began to receive the usual visitors. These were made up of such men as Dorsey, Parrish, Chapman, Eberle, Colhoun, Cleaver, Rousseau, McClellan, Jackson, Hodge, Rhees, Mitchell, Bell, Hartshorne, together with a crowd of medical students[5], anxious to hear the discussion of important questions in theoretical and practical medicine. Near the close of each winter, a committee, selected for the purpose, reported a list of lecturers for the weekly meetings of the next session, with the topics of lecture annexed. This list was published in the medical journal of the city, so that all who desired to know who would probably lecture on a certain night, might easily gain the information. So also, at the close of each meeting, the name of the next lecturer and his theme were announced by the secretary, in addition to which a notice of like import was placed in a conspicuous spot in the University edifice.

"Those whose memory is sufficiently retentive, and who were often present on such occasions, will recollect that Dr. Eberle was not an infrequent participator in the debates; and while it is conceded that he was neither a finished orator, nor what is usually understood by the term "eloquent", yet he spoke to the point, intelligibly and sometimes with great force. On one occasion, he had an opponent . . . who was very fond of quoting the works of old authors quite profusely, without, however, making a reference to chapter or page. The gentleman referred to, on one occasion, indulged in this proclivity to a larger extent than usual, and seemed to carry the audience with him, by what sounded like unanswerable argument. It so happened that Eberle, who was vastly more of a book-worm than his opponent, had read every author named in the discussion; and in reply, he complimented the last speaker for his apparent familiarity with the ancient writers on medicine. 'The authors quoted, or named, rather', said he, 'have indeed proved themselves to be true medical philosophers; but it so happens that not one of them wrote on the special theme which my opponent has been professedly discussing. There is not an attempt made by any of them to argue the question now before us; and I pledge my veracity for this statement.' Such were substantially the remarks then made; and in an instant the tables were turned, and the laurels were obviously won by Eberle."

Another vivid word picture of the Society and its meetings in its earliest days was drawn in the following nostalgic eye-witness account, apparently by Edward Cutbush, author (1808) of the first American book on naval medicine:

"The Philadelphia Medical Society, for example, a mere acorn once, which has grown into a huge oak, whose branches extend from the north to the south of this union, and whose motto might have been Quantum Latet, in allusion to its origin, instead of '*ex collisione scintilla*'. This society had, indeed, a very humble beginning; its junior members first held their meetings in Lyttle's School-house, a small frame building next to General Cadwallader's [i.e., Cadwalader] house, south Second below Spruce street; each junior member carried his candle with him, and friend Lyttle's ink-pots, in the desks, were the sockets for our candles; then and there were discussed, as we thought, *learnedly of course*, the merits of the Cullenian and Brunonian doctrines. . . . The young students met under the auspices of Drs. Kuhn, Hutchinson, Rush,

[4] In 1827 the charter was altered to enable the Society to hold a summer session beginning the first Saturday in May and meeting, with the exception of the month of August, until the regular winter session. Jefferson Medical College was by now under way, the school terms were lengthening and the medical instruction in numerous private institutions was expanding throughout the entire year. The Society henceforth met all year round skipping the months of August and April.

[5] Dr. Benjamin Rush, writing to Dr. Ridgley, a physician of Lexington, Kentucky, February 4th, 1811, wrote that "Our medical school continues to flourish. Our students amount this winter to 420" (18).

Shippen, Wistar, and Griffiths [i.e., Griffitts], and freely discussed medical subjects, without being denounced by this or that professor; we, indeed, adopted as a fundamental truth, Medicina respublica est, non autem Monarchia, multo minus Tyrannus" (19).

December 1st, 1824, the Society met with Dr. C. D. Meigs in the chair. The meeting was called for the purpose of altering and amending the laws. Concerning dissertations and discussions at each ordinary meeting of the Society the new laws stipulated that there should be read a discussion on some subject relating to the science of medicine. After the discussion had been read the members were to be permitted to express their opinions on the essay and the subject treated. The essayist was not to introduce into his dissertation any sentiment or language derogatory to the dignity of the Society or offensive to morality or decorum, nor would he be permitted to indulge in any kind of personal abuse, as it was considered desirable that the *argumentum ad scientiam* should alone find an asylum in a society dedicated to the promotion of the noblest of the sciences. During the subsequent discussion it was to be the duty of those who discussed to observe the restricted rules laid down for the government of the readers of the essay. No member would be at liberty to speak more than twice on the subject under discussion without having obtained special permission by vote of the society, nor more than once till all who might choose to speak would have spoken and the reader of the dissertation had been requested by the chairman to reply, if it pleased him, to the observations of the speakers. At nine o'clock, provided an opportunity did not occur earlier, the essayist was to have the privilege of the floor unless someone was there speaking, in which case, he was to wait until that speaker should have concluded his observation. Under no circumstance was the debate on any dissertation to be adjourned to another evening, but the subject was to be in all cases dismissed before the termination of that sitting.

SUBJECTS UNDER DISCUSSION AND PUBLICATIONS OF THE SOCIETY

The subjects chosen for discussion by the various selected lecturers could fit well into the program of any present day medical society. Many of the lectures were subsequently published; some even merited republication. The Society was thus responsible for some of this country's medical literary monumenta, one of the earliest of which was by Dr. Benjamin Smith Barton. On the 21st of February, 1798, when he was one of the honorary members, he read before the Society a paper which he then published as "Collections for an Essay Towards a Materia Medica of the United States" which went into three editions. This was one of the first important works in the English language on American drugs.

During the session of 1793–94, the fiery Dr. Charles Caldwell read a paper before the Society giving an account of his experiences in the yellow fever epidemic the previous summer. This was done in compliance with a promise to Dr. Rush respecting the doctrine of domestic origin of the disease, a question which at that time raised violent controversy. "At an early meeting, therefore, of the Philadelphia Medical Society," wrote Dr. Caldwell, "I introduced it for discussion, in a paper carefully written for the purpose. Having informed Dr. Rush in person of my design, I had procured from the President of the Society an order to the Secretary, to insert in the public prints notices of the intended debate, in order that there might be a full meeting, and that the advocates of foreign origin in particular might be present, and make their best practicable defence of their hypothesis." A vitriolic interchange occurred at this meeting between Dr. Caldwell and his opponents after the paper was read. Because of the long drawn out session the discussion had to be continued at the next meeting of the Society (20).

When Nathaniel Chapman graduated from the Medical Department of the University of

Pennsylvania in 1801, the subject of his inaugural essay was "The Canine State of Fever". This was written at the request of Dr. Rush. Dr. Chapman had previously prepared another thesis on the "Sympathetic Connections of the Stomach With the Rest of the Body", which he then read before the Philadelphia Medical Society. This contained the substance of his peculiar views on fever and other diseases as well as the modus operandi of medicines (21). Pre-eminent in the profession, Chapman was long president of the Society and was eventually elected the first president of the American Medical Association.

Charles Caldwell read a "Eulogium to the Memory of Mr. George Lee," which he delivered by appointment on the 24th of February, 1802; and on the 5th of February, 1802, "An Oration on the Causes of the Difference Between the Endemic Diseases of the United States of America and Those of the Countries of Europe", which was published.

In 1818, Charles Caldwell was again on the agenda, this time with a "Eulogium on Caspar Wistar" delivered before the Society and the public in Washington Hall, February 21st, and published at the Society's request. At the meeting of January 24th, 1818, he had already presented to the Society a resolution which was adopted. This resolution expressed sympathy at the passing of Dr. Caspar Wistar, late Professor of Anatomy in the University of Pennsylvania. It agreed that the members of the Society would wear a token of mourning on the left arm during the remainder of that session; and that they would gather together and move in a body to join in the funeral procession of their late illustrious fellow member. In addition to the eulogium by Dr. Caldwell, Dr. Chapman was also requested to write a memoir of Wistar.

Before this year was out, another highly respected member, Dr. John Syng Dorsey, died. A special meeting was called, with Dr. Dewees in the chair, and it was resolved to wear the customary "wafers" on the left arm for the remainder of the session as a token of mourning; to meet at the hall of the Society in order to join the funeral procession in a body; and to appoint a eulogist.

At the meeting of February 13th, 1819, when Dr. Charles Caldwell who had long been an active and enthusiastic member of the Society, left to take up his teaching post at Transylvania, Kentucky, the following resolution was unanimously adopted:

"Resolved that the thanks of this Society be presented to our late vice-president, Dr. Charles Caldwell, as a grateful acknowledgement of his long and unremitting exertions for the promotion of the prosperity of this institution and for the faithful and honorable discharge of those measures and important duties which at various times have been assigned to him."

During the meetings held in the spring of 1819, discussions in regard to the opening of a second medical school in Philadelphia in opposition to the University of Pennsylvania School of Medicine waxed hot and lasted long in the Philadelphia Medical Society as well as in the public press. With this attempt to establish a second medical school in Philadelphia, Dr. George McClellan, the founder of Jefferson Medical College, was not however engaged (22). From the opening of a private medical school in 1817 by Nathaniel Chapman to the final establishment of Jefferson Medical College in 1825, largely through the general academic respect for John Eberle and by dint of the belligerent efforts of George McClellan, a number of capable and ambitious men started private schools of their own in rapid succession. Throughout the entire 19th Century medical schools sprang up in this city in large numbers, but none rivaled the University of Pennsylvania as did Jefferson Medical College after the right to confer a medical degree was won by the latter school from the state legislature.

From time to time prizes and medals were awarded by the Society. A prize medal was early instituted by the Society to stimulate research and writing. At the meeting of March 7th, 1818 we find that because they were only compilations and not essays possessed of

original merit, the papers submitted that year in competition for the prize medal of the Society were all rejected.

In April, 1819, the corresponding secretaries of the Society, Dr. Thomas Hewson and Dr. John Barnes, announced (23) that a gold medal valued at $100 would be awarded for the best dissertation on the "History, Description and Most Successful Mode of Cure" of the epidemic then prevailing in various parts of the United States, and commonly known as *Typhus* or *Spotted Fever*. The essays were acceptable in either English or French. In 1821, Mr. William Lee, while only a junior member, delivered a paper on "Strictures of the Urethra and Fistula in Perineo." It may surprise some that a junior member, only a medical student, should be elected to speak on so important a subject as stricture of the urethra. But it must be remembered that state licensing of physicians to practice was not yet universally in vogue, and many parts of the new country would have been devoid of medical aid were they to be dependent upon medical men holding medical degrees. Consequently, there were quite a large number of practitioners who held forth on the basis of talent and experience without benefit of an M.D. Many of these practitioners, however, realizing their educational limitations and desirous of graduating from a regularly accredited school attended the medical lectures at Philadelphia. Already experienced in medicine they could often report on medical cases in practice to good advantage.

February 18th, 1820, the Society instituted a practice of publishing in one of the medical journals of the city, an annual report of all the essays and medical communications read before or presented to the Society during the sessions with the names of their respective authors and the date at which they were read or presented. So far as I know there was never any official separate publication of transactions. Lectures deemed worthy of preservation were published as separate pamphlets for distribution. At the same meeting Dr. Hare requested the attendance of the Society at his lecture room in the University where he would deliver a lecture on "The Tests for Arsenic."

February 16th, 1822, Drs. Thomas Harris, Charles D. Meigs and Samuel Jackson, as a committee to whom was referred the letter and documents of Mr. Plantou, "On the Subject of Artificial Teeth", begged leave to submit their report to the consideration of the Society. Their report is recorded as follows:

"Loss of teeth disfigures the face, impairs the voice and from an inability to masticate the food, injures the general health. To remedy these inconveniences, dentists have long been accustomed to substitute those that are artificial. The only difference of opinion which now exists is in the choice of the materials of which they should be constructed. The animal matter which has been in ordinary use for this purpose is of such a putrescent character that the strongest objections may be urged against their employment. Ivory, the tibia and teeth of oxen, the teeth of the hippopotamus and even human teeth when transplanted are all disposed to putrefaction. They contract, besides, a fetid odor which communicates diseases to the gums and the adjoining teeth and thus imparts to the mouth the most offensive scorbutic appearance. The saliva now becomes impregnated with the unwholesome matter issuing from the decayed teeth and diseased gums, and, being carried into the stomach, frequently produces the most unmanageable dyspepsia. To obviate the ill effects resulting from the use of such materials, Mr. Duchateau, an apothecary of Paris, had constructed teeth for his own use of hard porcelain. He communicated this discovery to the Academy of Surgery in the year 1776. These teeth were incorruptible and were perfectly able to perform the office of mastication but as they did not retain a durable enamel, they did not confirm the judgment which had been pronounced in their favor. The suggestions of Duchateau, however, have since exercised the ingenuity of many distinguished dentists, who, by a terra-metallic combination, have been enabled to form artificial teeth which cannot be distinguished

by the most attentive observer from those that are natural. For further improvements, we are indebted to the joint labors of Du Bois de Chemant and Du Bois Foucou of Paris, Fonzi of Italy and Mr. Plantou of Philadelphia. The latter gentleman has submitted to our inspection several beautiful and ingenious specimens of his art which we have subjected to a series of experiments. These experiments, the reports of the Athenaeum of Arts and of the Academy of Medicine of Paris, together with a number of certificates from respectable citizens of Philadelphia authorized us to give the following opinion:

1. The artificial teeth of Mr. Plantou are unalterable by heat.

2. Neither alkalis or acids (except the fluoric) make the slightest impression upon them.

3. The material of which they are composed being indestructible, the injurious effects resulting from those in common use are thus obviated.

4. They can be made of any shade of color in order to correspond in appearance with the adjoining natural teeth.

5. They are the least expensive in consequence of their great durability.

It is due to Mr. Plantou to add that he has recently invented an ingenious spring for the purpose of opening the double jaws of teeth (double dentiers) which possesses many advantages over those used by his predecessors. Should this report be accepted the committee would respectfully recommend its incorporation with the minutes of the Society and that a copy of it be furnished Mr. Plantou by the corresponding secretary."

To Anthony A. Plantou (1774–1839), who first settled in Philadelphia in 1817, goes the credit of initiating, in this country in that year, the use of porcelain artificial teeth (24). That these teeth, called "French beans", were far from being universally satisfactory, is, of course, self-evident, in the light of subsequent events.

In the 20's phrenology, as sustained by Gall and Spurzheim, stimulated thought, discussion and experimentation that laid much of the groundwork of modern cerebral neurology. Typhus fever was being clearly differentiated as a disease entity; so were other specific diseases. During this decade the physiology of digestion received its great elucidation in the studies of Beaumont, which did not go unnoticed in the Society's proceedings.

Medical ethics, as always, agitated the minds of all and in 1823, a symposium on medical ethics was arranged in an attempt to show that the present condition of the medical character in this country had attracted the attention of many individuals of considerable abilities, and that great talents had already been displayed in well meant efforts to raise the fallen dignity of the medical profession. Dr. Hugh L. Hodge was one of the three lecturers on the subject. He delivered his oration on medical ethics by appointment on February 15th, 1823, stressing the values of a liberal education to the medical student, and the oration was published soon after (25). He also advocated the value of a liberal education to the physician, and, aroused by his remarks, editorial comment in the medical press decried the situation in Pennsylvania which found the state without an adequate medical licensing law.

As with our present County Society, the old Philadelphia Medical Society was devoted not only to scientific lectures and debates, but kept ever in the forefront of its objectives this aim to elevate the ethical standards of new and old members of the profession. Then, as now, the difficult relationships between druggists and doctors were frequently brought to the attention of the profession. On November 27th, 1824, Dr. Bond on behalf of a committee to whom had been referred a communication from the College of Pharmacy, reported as follows:

"WHEREAS the Philadelphia Medical Society has received a communication from the College of Pharmacy, expressing its apprehensions of improper connection and collusion between physicians and apothecaries, whereby the former are allowed a portion of the profits of

the latter and as the Society will most cordially unite in any measures which aim at the accomplishment of laudible objects, therefore RESOLVED that the Philadelphia Medical Society use any such combinations as disreputable and unfair, and it is the duty of this Society to cooperate with the College of Pharmacy in any measures which tend to promote the dignity and usefulness of these branches of the healing art to which these Associations are respectively devoted. RESOLVED: that the foregoing preamble and resolutions be laid before the Philadelphia College of Pharmacy."

The committee also submitted the following:

"WHEREAS there is reason to believe that some apothecaries, who are not by their education qualified for the practice of medicine, are encroaching on the province of the physician; therefore, be it RESOLVED that the Philadelphia Medical Society use this practice as injurious to society, disreputable in itself and derogatory to the medical profession, and respectfully recommends the subject to the consideration of the Philadelphia College of Pharmacy. RESOLVED: that the foregoing preamble and resolutions be laid before the College of Pharmacy." On motion of Dr. Mitchell, the report was accepted, the resolutions adopted and the committee discharged.

Dr. J. K. Mitchell, in an oration near the close of the session of 1825, admitting the danger he incurred of wounding the feelings of many, lashed out against some of the worst practices of physicians and patients alike. Continuing the theme of medical ethics and high standards of professional conduct, Dr. John D. Godman, in his oration delivered to the Society February 8th, 1826, discussed "Professional Reputation." This was likewise printed. At the meeting of June 16th, 1827, a preamble and resolutions were drawn up with a view to gaining information upon the effects of the more popular empirical articles sold in Philadelphia and to investigate regular practitioners who supplied testimonials to various nostrums and secret remedies. This pernicious practice was rife and with the growing concern about medical ethics many doctors were greatly disturbed. A committee consisting of Drs. William E. Horner, *chairman*, Thomas Harris, Joseph Klapp, Charles D. Meigs and John Bell was appointed to circularize those doctors who were endorsing such specifics. This action, as well as the circular which was sent out, were published in the medical journals of the city (26). The *American Medical Recorder* (27) recorded these society proceedings with editorial comment vehemently opposing the entire procedure as being too mild a form of censure. Expulsion from the Society, a real form of punitive action if we can judge accurately from the tone of the editor's tirade against doctors pushing quack remedies, was advocated instead.

The committee brought in its final report on this matter and presented it to the Society at the meeting of December 16th, 1827. The Society then ordered the report to be published (28) and a reprint was distributed under the following title: "First Report of the Philadelphia Medical Society Committee on Quack Medicines." The first matter given attention was Swaim's Panacea. Among other things concerning this persistent panacea and testimonials in its favor, were studied the circumstances connected with the introduction of the nostrum into the practice of the Pennsylvania Hospital and the Philadelphia Almshouse Infirmary. Dr. Chapman, in answer to the circular, acknowledged having "overrated the value of the Panacea of Swaim." Drs. Gibson, Dewees and Parke, especially the latter, were taken over the hurdles in the report and severely criticized. Mr. Gerard S. Marks, apothecary to the Philadelphia Almshouse Infirmary, reported that in the year 1822 or 1823, Swaim obtained permission from the managers of that institution to give the Panacea a trial. In spite of lack of approval by the doctors, 67 bottles of this nostrum were purchased from 1822 to 1825. None was used after that. Dr. Emlen reported a number of cases in which the quack remedy was used without success. One was a boy in the Orphan

Asylum in Cherry Street who had been for years afflicted with scrofulous tumors all over his body. The disease had been treated without success by the different physicians of the institution, when the committee of management bought some of Swaim's Panacea, and placed the boy under the use of it, although Dr. Emlen protested against the measure as a needless expense. The patient died before he had finished one bottle. What the final results of this investigation by the Society may have been is hard to say. Although Swaim continued to publish his testimonials, with the names of many of the members of the Philadelphia Medical Society as well as other highly respected individuals prominently displayed in his advertising pamphlets, it is quite certain that there was a distinct discouragement placed upon the cooperation between reputable physicians and the advertisers of these nostrums.

November 8th, 1823, Dr. Mitchell read a report submitted to the National Vaccine Establishment respecting the introduction of the practice of vaccine inoculation into China in 1805, its progress since that period and its actual state. In 1825, Dr. Theodore B. Cox talked to the Society on the stethoscope, "a new instrument then coming into use."

In 1828 there was an attack upon the efficacy of smallpox vaccination and the Society busied itself in defense of this great humanitarian preventive remedy. At the meeting of February 16th, 1828, a committee was appointed to collect facts in relation to "The recent occurrence of smallpox" with a view to determining the opinion of the profession at large in regard to the efficacy of vaccination. This committee, consisting of Edward Jenner Coxe, D. Francis Condie and Charles D. Meigs, drew up a questionnaire under date of February 18th, 1828, which was distributed among the physicians of the city to ascertain their views in regard to the preference of vaccination over inoculation. They set out to settle the "question which agitates the public mind: *Shall we be safe from small pox if we are vaccinated?*" From the answers obtained to these questionnaires the committee concluded it had proved the question in the affirmative "incontestibly". The questionnaire and the committee's final report were given wide publicity, and published in extenso (29). Dr. William D. Brinkle, a member of the Philadelphia Medical Society, served the Small Pox Hospital during the epidemic of 1828 and honorable mention of this is made in the report.

In 1829 a bill came up before the state legislature for the removal of the Almshouse Infirmary to West Philadelphia. It was felt that such a step would prevent the use of this valuable institution for teaching purposes as the distance would hinder attendance of medical students to a site so far removed from the center of the city. A committee consisting of Drs. Samuel Jackson, Wm. E. Horner, Charles D. Meigs, John Bell and D. Francis Condie were appointed which published an extensive report advising against the move (30).

The oration in February 1829 was delivered by Dr. C. D. Meigs and then published. Dr. J. C. Rousseau read an "Essay on Hydrophobia" to the society on March 14, 1829, which also appeared in print (31). During this session discussion on the use of alcoholic beverages was carried on pro and con and a committee was finally appointed "to take into consideration the propriety of the Philadelphia Medical Society expressing its opinion with regard to the use of Ardent Spirits." Drs. C. D. Meigs, D. Francis Condie, R. H. Huston, Edw. Jenner Coxe and B. H. Coates served on this committee and urged the Society and its members to use their influence to suppress the use of spirituous liquors except as a medicine, to diminish the employment of ardent spirits in their practice and keep a record of deaths due to drinking. The society approved the report, thus, as it were, going on early record in favor of "voluntary" prohibition (32).

For the session of 1830, Dr. Benjamin H. Coates was elected orator. He delivered his oration before the Society February 10, 1830,

"On the Certainty of Medicine", which, as usual, was published.

This was the year Daniel Drake was in town. He was peculiarly suited for just such an organization as the Philadelphia Medical Society. The winter of 1830–31 was remarkable for the interest that was awakened by the public discussion of medical topics in the Philadelphia Medical Society. The faculty and students of the two medical schools sort of formed opposing teams. The champions of the opposing views were Dr. Samuel Jackson, professor at the University of Pennsylvania and Dr. Daniel Drake, late of Cincinnati, who for a season held the chair of the Institutes and Practice of Medicine in Jefferson Medical College. Dr. Jackson held a similar chair at the University and was one of the Vice-Presidents of the Medical Society. From week to week expectation was on tiptoe as each one read his paper, and in the debate which followed met the objections and criticisms of his antagonist. It was the school of the philosophers renewed. Dr. Jackson there exhibited his profound knowledge of his subject, his erudition and broad views of medical science, supported by his own clinical experience and deductions, and he came out of the encounter with enhanced reputation, although it was sustained with one of the most accomplished and practiced debaters that have ever arisen in the medical profession. It was no mean distinction to have triumphantly maintained his positions when Professor Drake was in opposition. While all who were listeners were deeply interested, the enthusiasm of the juvenile portion of the audience was at its acme (33).

On February 19, 1831, Dr. Thomas Harris delivered an oration in which he enumerated the virtues of preserving health through various types of physical and mental exercises.

When the world-wide cholera epidemic struck the Western Hemisphere in 1832, a committee appointed to investigate the disease made a careful report which was published in the medical journals and as a separate reprint. Before publication this report was read and approved at a special meeting of the Society held on the 30th of May, 1832.

Dr. Reynell Coates delivered a demonstrative lecture before the Society on November 21, 1835, "On the Indications of Dessault in the Treatment of Fractures of the Clavicle, and the Manner in Which They are Fulfilled by the Apparatus of that Surgeon", extracts of which were subsequently published.

The subject of hernia and its treatment was given considerable attention by the Society about this time. On December 27, 1835 a committee was appointed to investigate the character of Stagner's truss and other proposed means of radical cure of hernia. The tendency to patent every little contraption, a tendency just recently censured by the Supreme Court of the United States, was especially prevalent in regard to medical gadgets. The report of this committee was published several months later (34). Apparently the study of the matter was continued and in 1837 a special committee made its final report on the construction of instruments, and their mode of action, in the radical cure of hernia. The study had taken three years of deliberation and this report included a collation of the practical facts contained in a previous preliminary report, as well as notices, illustrations and additional cases of hernia, and disease resembling hernia.

The oration for 1837 was delivered by Dr. Joseph Warrington, a popular practitioner in this city, at the time an honorary member of the Society who styled himself "accoucher to the Philadelphia Dispensary". His subject was on the "Improvements of Medicine".

The 27th of March, 1839, the Society passed the following resolution and ordered it to be broadcast in the public press by the recording secretary, Henry Keim, Jr.:

"Resolved that all discoveries or improvements in medicine or surgery should be freely promulgated through the appropriate channels of medical information for the advancement of medical science and for the good of mankind, and that the appropriation of such discoveries or improvements by their authors, to their exclusive pecuniary emolument by the taking

out of Patents or otherwise, is at variance with those principles of liberality and beneficence which should distinguish the medical character" (35).

Finally, in April 1843 the Society met in an attempt to frame a code of laws to regulate the professional conduct of their members. The College of Physicians attempted to do the same and I suspect they worked in harmony on the matter (36).

THE OLD GUARD PASSETH AWAY

In 1837 the Society mourned the death of its venerated president, Dr. Philip S. Physick. Year after year, for fifteen sessions, he had been elected and re-elected president. Through all these years he had guided the fortunes of the Society to a point where it could be said: "This Society is very highly respected, and now probably numbers nearly all the physicians of the city, and its whole number of members throughout the United States cannot fall much short of 1500" (37). Two years later Dr. John Randolph read before the assembled Society a memoir of Dr. Physick. This memoir was published in a number of journals as well as in a separate pamphlet.

At a special meeting held on the 19th of March, 1840, the Vice-President, Professor Samuel Jackson, being in the chair, the Society paid tribute to their esteemed and beloved fellow member, Dr. Joseph Parrish, who had just died. Appropriate resolutions were passed; Dr. George B. Wood was requested to prepare a memoir and the Society attended the funeral. The proceedings were then published in the medical periodicals of the city and the next day's city morning papers, by the recording secretary, Edward Hartshorne (38). Dr. Wood read the "Memoir of the Life and Character of the Late Joseph Parrish, M.D." at the meeting of October 23, 1840. Dr. Joseph Parrish, head of the Philadelphia Association for Medical Instruction, one of the private medical schools which attracted many medical students, was a zealous member of the Philadelphia Medical Society and one of its most efficient speakers. His biographer noted that "they who are old enough to remember the highly animating scenes, which took place in the Medical Society about twenty years since, cannot have forgotten the prominent share in the debates taken by Dr. Parrish . . . It was on one of these occasions that he brought before the Society the stomachs of recently slaughtered animals, to show that those post-mortem appearances which had been considered as proofs of pre-existing inflammation, were often present in cases of violent death, occurring in perfect health" (39). He was for some time Vice-President of the Society.

Upon the news of the death of Dr. William P. Dewees, a special meeting was called by the Philadelphia Medical Society on Friday, May 21, 1841. Dr. B. H. Coates was called to the chair and resolutions were passed expressive of the deep regret at the decease of their fellow member and late Vice-President. Dr. Hugh L. Hodge was requested to prepare a memoir which was later read before the Society and published. In testimony of their respect for Dr. Dewees, the members of the Society attended his funeral in a body and for one month after wore a black band on the left arm as a token of their mourning (40).

TERMINATION OF THE SOCIETY

In 1845 Dr. D. Francis Condie, now an honorary member of the Society, published the annual oration delivered at the opening session of 1844–45. The next year, however, as we have seen, the Philadelphia Medical Society folded up its tents, deposited its records and books in the College of Physicians of Philadelphia and entered a state of suspended animation. Dr. T. D. Mitchell, in a reminiscent mood at a later date, wrote of the better days of the Society saying: "We cannot but regret the circumstances—and really we do not know precisely what they were, as we then resided in Kentucky—which operated to terminate the existence of the Philadelphia Medical Society. More than once during our residence in Frankford, five miles north of the city, we thought it worth while to attend the

weekly gathering, to listen to the earnest and instructive debates, and sometimes to take a share in the proceedings. There never was an expedient in operation in the city, and probably there never will be, from which the students in attendance on medical lectures derived more instruction; and for this reason, if there were no other, we have ever regretted that the Society has been abandoned" (41).

The resolution relative to suspension of activities was passed on the 13th of December, 1845, and used the following words: "RESOLVED: That the sessions of the Society be, and are henceforth, suspended until a formal call be made by the members, signed in the manner prescribed by the constitution."

The identity of the organization was not completely lost at this time. The movement for a national organization with representation from all local units was, under the impetus of Dr. Nathan S. Davis, fast reaching the point of realization. The Philadelphia Medical Society was a strong supporter of this movement, or at least a certain element in the Society was. When the College of Physicians of Philadelphia, the University of Pennsylvania and other strongly entrenched medical groups in this city refused to take part in the movement, a group representing the Philadelphia Medical Society went to the National Convention held in New York in 1846, and thus maintained the representation of this city in the foundation of the American Medical Association. Recalling this action on the part of the Society, Dr. John Bell stated: "To the presence and action of its delegates . . . a full share of the salutary course of the debates and resolutions of that body [the National Convention], and of its adjournment to Philadelphia, and the organization of the National Medical Association, is undoubtedly due" (42).

The delegates to this convention were elected at a meeting held on April 16, 1846. They were: Drs. John Bell, Henry Bond, George W. Norris, Isaac Hays, Isaac Parrish, Joseph Warrington, Alfred Stillé, J. R. Paul, Francis West, Gouveneur Emerson, Caspar Morris and Meredith Clymer; certainly a group that would have to be reckoned with at any assembly.

In 1847 there was another meeting of the Society and the following delegates were elected to attend the Philadelphia meeting of the National Organization which was, in fact, the first annual session of the American Medical Association: Dr. Bell, *chairman;* Drs. Emerson, I. Parrish, Norris West, Ashmead, Coates, Bond, S. G. Morton, Yardley, Griscom and Rodman.

That the Society was recognized as an existing entity at this time is also attested to by the fact that the Northern Medical Association, upon the occasion of its first annual oration, in 1848, sent invitations, among others, to the members of the Philadelphia Medical Society (43).

Again, in 1848, the Society elected delegates to the Baltimore meeting and in 1849 to the Boston meeting of the American Medical Association. After that period the Philadelphia County Medical Society began to function and the number of delegates from the institutions and medical organizations of this city and county was so large it was not thought expedient by the members of the Philadelphia Medical Society to send a separate delegation. It is thus quite evident that the Philadelphia County Medical Society took over the functions of the Philadelphia Medical Society as well as the leaders of its membership. When it did, the activities lapsed into almost complete somnolence.

It must have awakened sporadically, although the records of meetings are scant. The *Philadelphia Medical and Surgical Journal*, a magazine instituted in 1852, assigned a special column to report the transactions of the meetings of the Philadelphia Medical Society. In 1854 there was an account of the annual meeting (44) with an abstract of the address of the president, Dr. Thomas Betton. About 75 members were in attendance and Dr. Betton spoke on "Medical Education". Dr. Condie then read a paper on puerperal fever which drew out a warm discussion by Meigs, Biddle and others. "We thought of old times in the Medical So-

ciety when Drake, Johnson, McClellan and others used to amuse the young men by their intellectual combats", wrote Dr. James Bryan, the editor of this journal, in a reminiscent mood.

The Society remained thus on a stand-by status until 1858, when dissension arose in the Philadelphia County Medical Society and a number of members assembled with a view to reviving the old Medical Society. Some explanation of this disagreement seems to be in order.

The chief purposes of organizing a national medical body were to elevate the educational as well as the ethical standards of the profession as a whole. It was always the aim to have local representation from all parts of the nation to make up the national group, in the affairs of which the local representatives were to have equal voice in true democratic fashion. The original constitution of the American Medical Association in 1847 proposed the principle of representation by making active members of the association consist of delegates from medical societies and institutions. It was early evident, however, that only one group from any locality could harmoniously voice the wishes of the particular region which it represented. The founding fathers thus urged the formation of state and local associations and so framed the constitution as to make the great majority of the members of the national association consist of delegates from permanently organized state and county societies throughout the nation. In accordance with this plan, the Medical Society of the State of Pennsylvania was founded in 1848 and, as the next logical step, the Philadelphia County Medical Society in 1849. The Philadelphia Medical Society, as we have seen, then ceased to send independent delegates to the State Society and through it, to the National Association.

Furthering the plan to limit representation, on April 15, 1851, at a meeting of the Philadelphia County Medical Society, Dr. Thomas H. Yardley submitted the following resolution which was promptly adopted: "WHEREAS the Constitution of the American Medical Association, by providing for the reception of delegates from all permanently organized medical societies, medical colleges, hospitals, lunatic asylums and other permanently organized institutions, unjustly favors the profession in cities, where such institutions exist, and can readily be formed, and diminishes the importance and thereby discourages the formation of medical societies in rural districts, therefore be it

"RESOLVED, that the Constitution of such Society be altered so as to admit only delegates from county and state societies."

This resulted in lunatic asylums and hospitals being cut out of representation, but it was not until many years later that complete reform along these lines was finally brought about.

In 1857 a contest broke out in the Philadelphia County Medical Society in regard to the election of officers. At a meeting on January 27, 1858, Dr. Thomas Forrest Betton declared a previous election of officers irregular and his motion for a new election being sustained against vigorous opposition of a minority group, Drs. René La Roche, Condie and Lamb immediately resigned from a committee which had previously been appointed to bring certain matters before the American Medical Association. Composure was temporarily restored when Dr. La Roche was unanimously reinstated on this committee.

At a meeting a month later, however, the second election of officers was protested by Dr. Jewell as high-handed and rendering the Society subject to the whims of factions, and a third election of officers took place. The disgruntled faction then withdrew and revived the old Philadelphia Medical Society with a view to restoring independent representation in the State Society. A meeting was called April 3, 1858. At this meeting the question of revival was carefully examined, and in view of the antiquity of the Philadelphia Medical Society, of the large number and respectability of its members, both resident and non-resident, of its possessing a certain amount of funds and

a library which should be taken care of and applied to useful purposes, the usefulness of the association in former days, and the eminence it had for a long series of years enjoyed, it was determined to re-establish regular meetings and a call signed by 13 members was issued in the newspapers.

Other meetings succeeded. The Society was re-organized, the by-laws were modified and republished, officers were elected and new members admitted, "consisting, in many instances, of gentlemen who had never been attached to the County Medical Society, of some who still belong to it, and of some, who, displeased with its recent proceedings, have left its ranks or joined ours."

On May 24, 1858, it was decided to apply to the State Medical Society for the right of representation of such members as were not connected with the County Medical Society. Article VI, Sect. 1, of the Constitution of the Medical Society of the State of Pennsylvania, published with the proceedings of the April session in 1849, provided that members of the profession of Philadelphia would be permitted to form three societies, of which the College of Physicians, already in existence, should be one. The College of Physicians, however, would have nothing officially to do with the State organization, and so the constitution as published the next year, 1850, deleted this provision. The re-established Philadelphia Medical Society, then, with this in mind, applying to the State Society for admission of its delegates, argued that there was no valid reason why another respectable society could not take advantage of the invitation. They disclaimed any opposition or ill will to the Philadelphia County Medical Society. But that Society charged that they were recalcitrants, who, having been defeated in the attempt to dictate the officers of the County Medical Society for 1858, had resigned from the County Medical Society, hunted up the old Philadelphia Medical Society and galvanized it into some little life in the hope that the State Medical Society would allow its members to be therein represented, and that it might ultimately, through the enlargement of its ranks, supplant the County Society.

The dissenters persisted in their efforts; a meeting was held in the hall of the Locust Street Lyceum on Monday evening, February 7, 1859 (45) and the following officers were elected for the current year: President—R. La Roche, M.D.; Vice-Presidents—John Neill, M.D., George W. Norris, M.D.; Treasurer—John J. Reese, M.D.; Corresponding Secretary—John B. Biddle, M.D.; Recording Secretary—Anthony E. Stocker, M.D.; Censors—Francis West, M.D., Lewis Rodman, M.D., Samuel L. Hollingsworth, M.D., Edward Hartshorne, M.D., D. Paul Lajus, M.D.; Orator—Edward Hartshorne, M.D.

Delegates were elected to go to the annual meeting of the State Society. The State organization met April 20, 1859, and at this meeting the County Society presented a remonstrance in regard to this demand for equal participation in the affairs of the State Society by the Philadelphia Medical Society, maintaining that the Philadelphia County Medical Society was the only organization, "whether in name or in fact, that can justly be representative of the county" and protested against the admission of the newly revived Society on the grounds that the County Medical Society had a respectable portion of the regular physicians of the county, including nearly all the members of the Philadelphia Medical Society, as members, and was open to all others. It also feared a second society would engender opposition, rivalry and jealousy, and destroy harmony among the profession. This was supported by vote of the State Society and the delegates of the Philadelphia Medical Society were refused admission.

But La Roche and Company did not give up the struggle. June 27, 1859, the Philadelphia Medical Society held a meeting at which it drew up a lengthy report in regard to the issue as it had occurred at the previous meeting of the Medical Society of the State of Pennsylvania (46). This report, signed by a committee of three, viz., René La Roche, A. E. Stocker and Samuel Lewis, outlined the history of the

Philadelphia Medical Society and its purported future aims, and expressed the grievances of the Society against the actions of the County and State Societies in denying it recognition.

At the meeting of the Philadelphia County Medical Society held July 20, 1859, the resignations of the dissenting group were tendered, but these were "laid on the table". In October, the resignations, eleven in all, were accepted. W. S. W. Ruschenberger and Isaac Hays joined them; eleven more resigned January 18, 1860. Still others dropped out of the County Society subsequently. In his annual address, Dr. B. H. Coates sadly remarked upon the defection of his colleagues. "The first, and sufficiently obvious, thought that naturally arises in our minds, is one of condolence. Instituted for a great and wise purpose, and one particularly calling for a unanimous action and sentiment, the Philadelphia County Medical Society cannot but greatly regret the cessation of the attendance and assistance of so many and so qualified men" (47).

In 1860 René La Roche delivered the annual oration before the Philadelphia Medical Society, a scholarly paper on the unsanitary state of the Pontine Marshes as evidenced by a study of one of the Satires of Horace. We then lose further track of the affairs of the Society until 1868. On February 16, 1868, the Society established the fund at the College of Physicians already mentioned, which is still in existence. This seems to have been the final act in winding up the affairs of the Philadelphia Medical Society.

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TRANSACTIONS & STUDIES

of the

College of Physicians of Philadelphia

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President's Address*

By RICHARD A. KERN

THIS meeting marks the close of the one hundred sixty-sixth year of this College. Our law requires that at this time the President shall make an address. Custom has further determined that it shall take the form of a Report on the State of the College. A few of the Fellows will have to listen to it in person. But it will reach every Fellow in the April issue of our *Transactions*. Every Fellow is therefore requested to *read it to the end*, for it has an urgent message, a desperately urgent message, for each one of them.

It is a matter of great satisfaction to note that the College has continued to grow in service and usefulness to an ever-widening community. For this institution does not exist unto itself alone: its scientific meetings are open to all; it cooperates with the medical schools of the city in providing instruction in the history of medicine; its library, the third largest medical library in this half of the world, is free to all who wish to consult it (and it is so consulted, not only by physicians, but by students of the five medical schools, by graduate students, residents, clinicians and researchers in many laboratories, and in the sixty-seven hospitals in the greater Philadelphia area, by writers and publishers in the country's largest medical publishing center, by scientists in many industries, by lawyers, clergymen, welfare workers and representatives of the lay press). Through its interlibrary loan and photostat services, the College has extended its influence to many states and foreign countries. Of these things every Fellow of the College may justly be proud.

FELLOWSHIP

The Fellowship has shown an increase during the year. In December, 1951, the total number of Fellows was 877. In December, 1952, there were 959 Fellows, of whom 869 were Resident, 2 Associate Resident, 79 Non-resident, 6 American Honorary, 2 foreign Honorary and 1 Associate Honorary.

Deaths

Death has taken from us, during the past year, 8 Resident Fellows, 1 Non-resident Fellow and 1 Honorary Associate Fellow. As I read their names, the Fellows will please to stand.

Resident Fellows

James Harold Austin
Eugene A. Case
Louis Cohen
Louis Lehrfeld
Charles-Francis Long
Howard Y. Pennell
Harry Stuckert
George Woodward

* Read at the business meeting of the College of Physicians of Philadelphia, 7 January 1953.

Non-Resident Fellow

Charles A. E. Codman

Honorary Associate Fellow

Professor Edwin G. Conklin, of Princeton University

THE STAFF

Death dealt our staff two cruel blows in close succession. On February 23, 1952, our Superintendent, Mr. Alfred F. Nelson, died after an illness of only a few days. He had been an able and faithful custodian of our property.

A month later, on March 28th, there suddenly died our Executive Secretary, Fellow member and former officer, Dr. James Harold Austin. Elected to Fellowship in 1914, he had taken an active part throughout the years, serving the College in various capacities, including that of its Secretary. When he retired as Professor of Research Medicine at the University of Pennsylvania in 1949, he accepted our newly made post of Executive Secretary. His keen interest in the College, his accurate knowledge of its affairs, his talent for organization, his meticulous attention to detail, his personal charm, and his infinite patience in dealing with others combined to make him a pillar of strength. It will be difficult, I fear impossible, to find a successor with all his outstanding qualifications.

At this point I wish to pay high tribute to our Staff, not only for their loyal and excellent service to the College throughout the year, but particularly for the smooth efficiency and the willingness with which, at personal sacrifice and in addition to their own duties, they assumed those of the Executive Secretary and of the Superintendent, so that the functions of the College continued without interruption. Dr. McDaniel and Mr. Morse, our Librarians, Mrs. Wade, the Curator of the Mütter Museum, Miss Lang, the Clerk of the College and all the other members of our Staff have earned our deepest gratitude.

Mr. Morse, in addition to his duties as Administrative Associate Librarian, has accepted the post of Superintendent. As Assistant Superintendent, we were fortunate in engaging Mr. George S. Allen, who has proved an able successor to Mr. Nelson in the care of this building. I call attention to the painting of the hallway that has been carried out by our own employees under his direction.

MEETINGS, SECTIONS AND COMMITTEES

In the same number of the *Transactions* of the College containing this address will be published the List of the College Lectures presented at our Stated Meetings during the year; also the transactions of the several Sections, and the reports of the Standing Committees. They will show that these activities have been well carried out, and that these functions of the College have been faithfully served. The Fellows are urged to read them carefully, not only to acquaint themselves with the facts concerning the College, but to enable them to offer helpful suggestions.

ALVARENGA PRIZE

The Alvarenga Prize was awarded on July 14, 1952, to Norbert Wiener, Ph.D., of Cambridge, for his contributions to the field of Cybernetics. It was the seventh such award to non-physicians since the founding of the Prize in 1883.

MÜTTER MUSEUM

The Mütter Museum has attracted further valuable accessions. The Curator, Mrs. Ella N. Wade, continues to publish in *Philadelphia Medicine* short articles on items of unusual interest in our Collection, that are drawing wide and favorable attention.

PORTRAITS OF PAST PRESIDENTS

The College is grateful to Dr. T. Grier Miller, Past President, for the presentation of his fine portrait, painted by Mr. Charles Baskerville. It hangs, for the present, in the office of the College on the first floor. This reduces to six the number of Past Presidents not so represented in our collection of portraits.

THE LIBRARY

The scope of the work of the Library may in a small measure be appreciated from these figures: Over 14,000 visitors consulted some 55,000 volumes and uncounted thousands of current journals; they borrowed over 7500

volumes; 3013 photostats were supplied and over 2300 volumes were loaned to 108 libraries in 23 states. Accessions of books during the year numbered 2025, and we received 1710 journals. This was accomplished in the face of rising cost of publications, maintenance and salaries.

The Library Committee is therefore the more to be complimented on its wise administration and careful husbanding of our limited funds. It is with corresponding regret that we receive the decision of Dr. Truman G. Schnabel to retire from this Committee on which he has so long and so ably served as a member and more recently as Chairman.

The Future of the Library

At this point, we come face to face with the most serious problem that has confronted this College in all its history. Over the years, a growing membership and a steady accumulation of endowments have made it possible to acquire and to house all the significant publications in the entire field of medicine. In short, we have been able to maintain a medical library of the first rank.

But in the last decade three things have happened that by their unfortunate conjugation threaten for the first time in our history that eminence of our Library. There has been a great upswing in the output of publications in all fields of medical endeavor, both in this country and in many foreign lands. This in turn has used up our available storage space more quickly than was anticipated, so that today our stacks are filled to overflowing. And, worst of all, the inflation of our currency has sharply reduced the purchasing power of our limited income. Last year, for example, the average cost of each book purchased was $7.24, more than double the $3.24 paid three years before. Today, in order to continue to maintain a first class library, we must at one and the same time increase our funds to purchase publications, our space in which to house them, and our income to maintain both.

For it is our intention to continue to have a library of the first rank. To curtail our accessions even for a few years would cause it to fall rapidly to an inferior level, for it is on the acquisition of current literature that the life and usefulness of a library depend. To let that happen to our Library is unthinkable.

As for the problem of space, it can not be solved by removing less-used old material to distant cheaper storage spaces, for that would increasingly impair the usefulness of the active section of the Library. Nor can microfilming of certain items solve our problem, for although this would save space, it is more expensive than building new stacks. Therefore we must build more stacks.

BUDGET

As for the money needed to achieve these ends, the Budget for the ensuing year, as adopted this evening, shows how critical is the present financial situation. In the past it has been possible to save a little each year for unforeseen contingencies and for building up our endowment. This year, when our anticipated expenditures of about $94,000 will be the largest in our history, the anticipated income of about $94,000, also the largest in our history, will nonetheless all be expended and we even reckon with a potential deficit of $85. This critical situation has not been unanticipated, although its approach has been accelerated by the inflation of the last few years. During the administration of President J. Parsons Schaeffer, the first survey of the needs of the College was conducted under the Chairmanship of Dr. T. Grier Miller. Throughout his administration, Dr. Miller furthered the program and set in motion a well-planned campaign to meet those needs.

The estimated cost of the necessary building alteration and enlargement and the additional endowment to implement and maintain the Library together amount to $1,500,000, of which $1,250,000 is our minimum goal that must be attained within less than 2 years from now. These figures to many may seem staggering, nay, fantastic.

That they are beyond the means of our Fellowship to contribute, is fully admitted. But that they are within our capacity to obtain from our well-wishers, is stoutly maintained.

We have a cause that deserves lay support, because our Library makes an important contribution to medical science, medical education and medical practice in the community, and therefore to the health and happiness of all citizens. We need to convince our lay friends of the truth of this, and to show to them by our own giving that we act on that conviction.

The first part of our campaign, therefore, has been to seek gifts from the Fellows personally, and that they in turn, as occasion offered, solicit gifts from their friends.

Building Fund

The money contributed by Fellows is in an account called the *Building Fund*. As of today this amounts to $74,938.78, and there is in prospect an additional $4930.09 in pledges. The Section on General Medicine was good enough to give $1000.00.

Development Fund

The money received from friends of the College through the solicitation of Fellows is in an account called the *Development Fund*. As of today it contains $26,827.81, and an additional $600.00 are pledged.

James Harold Austin Memorial Fund

Last year some of the friends of Dr. Austin had the happy thought to endow a memorial in his honor by adding to the endowment of the College the James Harold Austin Memorial Fund. It now stands at $706.75, and shows prospect of reaching a sum many times that amount. The section on Medical History has given $100.00.

In short, the Fellows have to date raised a total of $108,003.43, inclusive of the $5530 in pledges.

With this growing proof of earnest effort on the part of the Fellows, it will become increasingly easier to find a hearing and to get help from foundations, business houses, industrial concerns and individuals, both in and out of Philadelphia. A year ago, President Miller could report that a foundation in another state had made a tentative promise of $250,000. Since then, through the good offices of Dr. Miller, the Donner Foundation of this city has promised a gift of $100,000. Yet other large contributions are in the offing.

But the promises of the larger amounts just mentioned are conditioned on our raising certain sums within a given time. The gift of the Donner Foundation, for example, is contingent on our raising from all other sources a total of $1,250,000, and this must be accomplished by May 1, 1954. There is at once our inspiration and our challenge.

Each Fellow who can, should give what he can. *But, what is far more important, is that each Fellow can and must ask others: his patients, friends, relatives to give, if they can.* Now please note this point: *No gift is too small be be gratefully accepted.* It is far better to receive a hundred small gifts than a single large one for the same total amount, for in the first instance there has been gained the good will and interest of a hundred givers in addition to the money given.

Thus far, each of 20 Fellows has succeeded in raising between $500 and $1000 by his own efforts; each of another 22 Fellows has succeeded in raising between $1000 and $2000; 7 more have passed the $2000 mark, and one more has a score of over $8000. Our Fellowship today is over 900 strong: how easy would be our task if each of them felt moved to make a request of only one prospect every week throughout this year. It would take only 15 minutes to make each one. But in the aggregate that would mean 12,000 man-hours, or 1500 eight-hour days of intensive work on behalf of the College.

This day marks the close of the College year. It is also the beginning of the New Year. As we look about us, in this beautiful building housing its priceless treasures, we should remember that all of this is the product of the work of those who preceded us. And we should remember that it is our individual and collective responsibility to pass it on to those who follow, as we received it: an institution maintained in the front rank of the medical libraries of the world. To that purpose let us dedicate ourselves this day.

Annual Report on the Library*

ADMINISTRATIVE

This year's annual report considers the nature of the independent medical library, the threat to its continued effectiveness and a possible course of positive action to preserve this essential link in the chain of free medical research.

Free men. This generation is witnessing a world struggle of ideas. The faith of the democratic way of life in its future rests on the belief that free men can create an ever improving civilization; that through the processes of free education, they can perfect self government; and that through the researches of free science, they will increase the usefulness and happiness of the individual.

Free science. When scientific men speak of freedom, they assume the political freedom of the institutions in which they work, and plead for the freedom to seek truth without regard to its immediate applicability. Free science will not subvert its findings to a political philosophy nor can it condition its objectives in terms of immediate rewards. The practicality of this seemingly undirected research is often illustrated by the hypothetical research team assigned to the exploration of a new continent with the injunction that they seek only gold. Such seekers would then find only gold if, indeed, they found anything. In contrast, research men, free of any restriction except to discover as much as possible about such an unknown continent, would be able to combine curiosity with imagination and add new truth to present knowledge. This truth, properly recorded and made available to other seekers, would form the basis for further progress.

Free medical research. Lest it be thought that this is merely a layman's theorizing, a prominent scientist's concurrence is found in a paper delivered by Professor Albert Szent-Györgyi at the dedication of Sterling-Winthrop Research Institute's laboratories in 1950. Discussing *The next half century in biochemistry*, Dr. Szent-Györgyi says, "I often hear distinction drawn between 'basic' and 'applied' research with the unspoken implication that 'basic research' is that which cannot be applied and thus is useless. There is no such difference for all knowledge is useful, all research is but applied research. The difference is merely in timing and dimension. 'Applied research' is the application of knowledge already acquired, paying cash return. Basic research, which seeks new knowledge for knowledge's sake, new truth for truth's sake, is the foundation of the applied research of tomorrow. All really important progress of today was abstruse, apparently useless research yesterday, and if we neglect basic research today we have cut out the roots of progress of tomorrow."

Speaking of the teamwork and support needed for this basic research, Dr. Szent-Györgyi reminds us, "The tendency is to spread funds as thinly as possible and to invest them in problems promising cash return, as far as those funds have not yet been used up by the process of collecting them. There is little left for the apparently long and tortuous path of basic approach. There is that queer paradox in scientific research that the shortest route to real progress, the only short-cut, is that which seems the longest, that of fundamental research which digs down to Nature's base to come up with new knowledge. That which seems the shortest route, and hunts for immediate application is in fact the longest, leading into 'nowhere'."**

Agreement was reached on the same point during a recently televised symposium on the year's progress in medicine. Dr. Leonard A.

*1 November 1951–31 October 1952.

** In: Sterling-Winthrop Research Institute. The next half century in medicine: a symposium. Dedicatory exercises, May 17–18, 1950. Pp. 46–47.

Scheele, Surgeon General of the United States Public Health Service, and Dr. Leland J. Haworth, Director of the Brookhaven National Laboratory, emphasized that our most gratifying discoveries often came from very long research on fundamental problems unrelated to the problems ultimately solved. They also regretted that some fields are better financed than others, thereby decreasing opportunities for research. They feel that such splinter movements drive narrow salients without creating any broad understanding. These scientists emphasized that medical research saves money, and they hope that we will consider spending as much money on medical research as is being spent on the development of the H-bomb.

Free medical society libraries. The pertinency of these considerations to the library whose annual report is presented herewith, lies in the similarity of its aims to those of free medical research and in the problems which arise from the very nature of this independence.

The Library of the College of Physicians of Philadelphia, like other medical society libraries in this country, is a free rather than a captive library. It is free in the sense that it is dedicated to the collection of truth as revealed by basic research as well as of the applications of this research in man's struggle against disease. Here, the product of free men's research in the laboratory is recorded along with the clinician's experience at the bedside. This library's aims are only to acquire, process, and service as large a portion as possible of this every-growing stream of facts for all free men engaged in medical research or practice. Because of the desire to assist future basic research as well as to serve those who translate such research into therapeutics, the library acquires literature for its future possibilities as well as its present practicality. To illustrate the way in which this may influence an acquisition policy, this library emphasizes journal literature, in which most original research first appears, perhaps to the detriment of textbooks and manuals whose primary function is often best served by an eclectic approach and whose value is therefore often quite transient.

Independence of any one makes it essential to all. This library is not the captive of any institution of higher learning whose curriculums or teaching philosophy could affect its collecting policies. It is not the captive of any commercial enterprise whose pragmatic research program could limit its universality. It is not the captive of any governmental agency whose existence and support would be vulnerable to political pressures. This very independence and the broad view which it engenders makes it essential to all of the other groups.

The price of independence. Along with its advantages, this independence creates certain problems.

The tremendous size of the literary output of basic science is the first problem of an independent library. The Armed Forces Medical Library, in its 1950 annual report, selects the years 1949 and 1950 as the ones in which, "One after another learned specialists and committees reported, first, that their libraries lacked alarming portions of the world's knowledge as recorded by contemporary research in many fields, and second, that much of the literature available in libraries was practically inaccessible because its volume had overtaxed the bibliographical apparatus necessary to uncover it."

The costs of acquiring a respectable segment of this knowledge and making it readily available to time conscious research men and busy practitioners are increasing more rapidly than our present sources of income.

This library and other medical society libraries are performing essential public services far beyond their obligations to their parent institutions. It should be noted that in many communities and many subject fields, our universities and colleges clearly recognize this community responsibility. However, the campus community rightly demands and receives the greater part of their attention, whereas the Fellows of the College of Physicians represent a small part of their library's service load.

The third disadvantage of this freedom is that an independent library does not have an exclusive or even prior claim upon the financial

support of all the members of any given group. Just as it is not a captive library, it does not have a captive clientele. Members of a learned society have many compelling demands made upon their financial resources by the hospitals in which they serve and by the schools from which they received their training. Practicing physicians who frequently accept positions of civic leadership are expected to contribute to every worthy community and national campaign.

Commercial enterprise, no matter how public spirited, has prior responsibilities to its employees and stockholders and is not always able or willing to share its profits to any considerable degree with all of the agencies of basic research whose findings made its profits possible. The highly competitive nature of such enterprise and its natural inclination to reinvest profits in its own expansion, limit the possible return from this quarter. Much as we rely upon private philanthropy, it is generally conceded that the day of large individual fortunes is gone and the major charitable foundations seek projects that catch the public imagination or set an almost impossibly high requirement for local contribution as a prerequisite to their participation. The national fund drives have fragmented research support to the level of single diseases, which may enhance their drawing power but which brings the efficiency of their scientific productivity into serious question.

Even the American Medical Education Foundation, sponsored by the American Medical Association, has restricted its objective so far to "the raising of voluntary funds from within the medical profession to help alleviate the financial strain under which the medical schools are laboring." During the period June 1951 through June 1952, $1,417,550 was contributed to the medical schools. The most unfortunate aspects of this situation are the fact that such a campaign draws away much of the support which might otherwise come to the medical society libraries and the ironic fact that many of these medical schools have neglected their own libraries because of the proximity of medical society libraries.

The National Institutes of Health of the Public Health Service awarded $17,129,544 for research grants and $1,568,371 for fellowship awards from fiscal year 1951 funds. None of this money went directly to medical libraries. However, many of the recipients of awards in the Philadelphia area rely heavily upon the resources of the College of Physicians Library for their literature searches and the libraries of the National Institutes themselves make frequent use of this library.

We find ourselves bound to echo the sentiments of the Boston Medical Library as expressed in the August 23, 1951, issue of the *New England Journal of Medicine* (p. 311): "Public benefactors have been pouring funds into universities and hospitals without regard to the needs of the essential libraries, without which the other institutions could not operate efficiently. A campaign of education should be inaugurated to remedy this condition."

Medical schools may increase tuition or canvass their alumni for aid; hospitals whose role of mercy is common knowledge can appeal to the general public and can raise fees; commercial enterprise can raise prices and governmental libraries can call for increased tax support; but the medical society has already pushed dues to the limit and its library may well be considered the poor cousin in the research family.

If the medical society library is allowed to deteriorate and even disappear from the scene, wasteful duplication of effort and money will result when hundreds of private hospitals, medical schools, private enterprises, and governmental agencies attempt to raise their own libraries up to standard. And even if money were no object, it would be impossible to duplicate today such libraries as those of the New York Academy of Medicine, the Boston Medical Library, and the College of Physicians of Philadelphia.

Suggested alternatives to decline have been corporate affiliations or mergers with other libraries or institutions, which would destroy the very independence which has fostered these libraries' development into essential parts of medical research.

The College of Physicians of Philadelphia. The story of the steps taken by the Fellows of the College of Physicians of Philadelphia in recent years, to meet the increasing costs of their library's operation and to provide more adequate housing for its collections, illustrates the effort required to maintain current levels of service. For more than 150 years the great generosity of the Fellows of the College of Physicians of Philadelphia provided sufficient financial support for their library, thereby enabling it to serve freely the medical community to which it belongs. Many of these Fellows accepted the College library as their primary concern, giving freely of their time, advice, and money, to win for their library a position of national leadership. This tradition of concern is continued by the present generation of Fellows, who are currently engaged in a campaign for funds to provide additional stack space and other physical improvements.

In July of 1948, the College reluctantly agreed to require contributions to the support of its library from those borrowers who were considered to be in a position to make them. Certain categories of borrowers were still granted free borrowing privileges and the library was and is still freely open to all comers for consultation of materials in the library. It was soon apparent that this measure was insufficient to meet the rising costs of library operation. The Fellows have allocated larger percentages of the College's total income to the support of their library but there must be a limit to this process. Thus it becomes apparent while a difficult and energetically pursued campaign for funds for building expansion is still far from completion, that a need for greater support will be required for current operating expense than can be decently expected from the Fellowship of the College. Continuing support from sources outside the College or a tremenduously expanded endowment will be required.

The devotion of Dr. J. Harold Austin, who gave the major effort of the last years of his life to this cause, and Dr. T. Grier Miller, who implemented the well conceived plan, prove that the struggle will not have been lost by default.

The librarians' responsibility. Other medical society library administrators may wonder, in common with us, what constructive steps we may take toward a solution of this dilemma. Is it enough to present our sponsoring bodies with annual budget requests for minimum operating standards? May we with clear consciences transfer the responsibility for deciding the ultimate fate of these institutions to others who may have no greater freedom of choice than ours. If this is a common problem, is there a common solution which we could agree upon and initiate? May not the answer lie in the campaign of education called for by the Boston Medical Library? Might a statement of our needs as a group attract the interest of industry or of national philanthropic organizations?

We have hitherto shared the traditional view of librarians as custodians and handmaidens to the arts and sciences, but when our standards of service are threatened, we find ourselves smoked out from our stacks, administrative offices, and circulation desks, into the competitive struggle for money. Perhaps education should be left to professional teachers and fund raising to those specially trained for that work; but if our case is to be lost for want of an advocate then we shall be obliged to plead it ourselves.

The extent and magnitude of the problem should be determined first. The need should then be brought to the attention of anyone and everyone who could help achieve its satisfaction.

The College of Physicians Library has circulated a questionnaire among libraries similar to itself to determine the extent of this financial problem and their interest in possible concerted action. Although it is too early to appraise the results of this circularization, an analysis will soon be available to the responding libraries.

A logical substitute for the competition for financial support by the various segments of medical research might be a cooperative cam-

paign. A super committee of medical organizations or a foundation such as the Rockefeller Institute for Medical Research could evaluate the relative needs of all branches of medical research and allocate funds more equitably and less expensively than is now the case.

If the independent medical library is to continue its essential role of serving both basic science and applied research it must gain more widespread support. If free men are to create the best possible culture, then free institutions must be allowed to make the greatest contribution of which they are capable.

Year's Progress

Turning from macroscopic considerations to microscopic details, the following items may be of interest.

An eight page leaflet, outlining the library's history and describing its resources and services in the briefest terms, appeared at the beginning of the report year. It has proved to be as useful as was anticipated and has been widely distributed.

A detailed organizational plan has been prepared for the proposed reactivation of the Friends of the Library. The closer affiliation of those interested in the welfare of this library will increase the effectiveness of their interest.

Library working conditions were improved by the refurbishing of the staff lunch room and by the provision of a second study for rest room purposes.

The installation of a library bulletin board in the lower lobby provides an opportunity to publicize the library's wares to the large numbers of physicians who attend meetings in the building. In addition to the exhibits of its own materials described in the historical section of this report, the library sponsored an exhibit of public health posters gathered by Roy Jansen under the auspices of the Medical Society of the State of Pennsylvania. A week prior to the exhibit, the president of the College appeared on a television program devoted to it, giving the exhibit a most effective send-off.

The library gave orientation lectures to its perennial visitors, the Freshman Class of the Woman's Medical College and the Training School Class of the Free Library of Philadelphia.

Benefactors

A list of the donors of books and other library materials appears in the statistical section of this report. Note is made here of the library's gratitude for some of the financial assistance which it received during the year.

Institutional contributorships with the addition of supplementary contributions in some cases brought the following revenue; Sharp & Dohme, $1,000; Smith, Kline and French, $750; National Drug Company, $500; McNeil Laboratories, $100.

Dr. Philip F. Williams made a donation in memory of Dr. J. Harold Austin and Dr. J. Monroe Thorington gave generously during the year, directing much of his giving into the fund for the construction of new stacks for the library.

Dr. Austin

The librarian and the administrative associate librarian—indeed, all the members of the staff who knew him, as most did—wish to record here their sense of loss in the death of the College's Executive Secretary, Dr. J. Harold Austin. His wise counsel and sturdy support of the library's various programs for self-improvement, over many years, may well receive in these published annals of the library, if on historical grounds alone, the warm and grateful recognition accorded them in our individual memories.

The Staff

The coincidence of the closing of the library for floor refinishing with the time of the Medical Library Association's annual meeting, gave five members of the staff the chance to attend this convention. The Medical Library Association appointed the following members of the College library staff to its committees: Mrs. Bready was reappointed to the Committee on Periodical and Serial Publications;

Mr. McDaniel was reappointed to the Committee on Abstracting and Indexing. Mr. Morse was reappointed to the Committee on Gifts and Grants.

Members of the staff took a leading part in the formation of the Philadelphia Regional Group of the Medical Library Association. Mrs. Bready is a member of the Projects Committee, Miss Hodge is a member of the Program Committee, and Mr. Morse is the Group's chairman this year.

Miss Hodge wrote a column for the December 1951 issue of *The Chronicle* of the Syracuse School of Library Science concerning her work in the College library.

Mr. Morse is Managing Editor of the *Bulletin of the Special Libraries Council of Philadelphia and Vicinity* and he served on the Nominating Committee of the same Council. He is vice-president of the Board of Trustees of the Narberth Public Library.

Mr. McDaniel attended the organization meeting of the Friends of the Armed Forces Medical Library. He represented the Medical Library Association on a Joint Committee, sponsored by the Council of National Library Associations, which was organized to survey the relationships between libraries and the federal government. This Joint Committee held its first meeting in the College library. Mr. McDaniel was a member of a committee appointed to survey the Cleveland Medical Library Association.

A major change in the library's personnel was occasioned by the retirement of Mrs. Maud Maines who had been the Circulation Assistant for six years. Her successor is Mr. William K. Beatty, a graduate of Columbia University. During the six weeks period when this position was unfilled, members of the staff contributed efforts far beyond the expected measure to maintain standards of service and the library administration is particularly grateful for their spirit of cooperation.

On recommendation of the Library Committee, the title held by Mr. Morse was raised from that of Administrative Assistant Librarian to that of Administrative Associate Librarian.

E.H.M.

HISTORICAL

With the acquisition of the Packard and Krumbhaar collections, respectively, offering occasions for understandable jubilation in our last two reports, we come now to survey a year which reminds us not to expect to find the goose hanging so high every day in the year. What we see, in fact, on looking back, is progress maintaining its normal sober gait. People have been good to us, but neither they nor we have succeeded in passing any miracles.

While it is accepted that some portion of the library's general funds should be devoted to augmenting the library's historical holdings, the actual doing so becomes increasingly difficult in the face of steadily rising operational costs and the library's other obligations. Meanwhile, routine pressures on the staff—a small one in relation to the volume and complexity of the present and potential business to be transacted—make impossible any continuous or concentrated or concerted approach to the orderly development and capitalization of the historical collections. They remain, in consequence, largely "ill-housed, ill-clothed, and ill-fed." Recognition of these hard facts is required, if one attempts any just appraisal of a year's activities in this area of the library's lively day-by-day operations. The hard facts would be a great deal more distressing to us than they are, were it not for the constant encouragement given us by an ardent group of historically-minded Fellows and other friends of the library; and for the knowledge of the campaign now afoot to ameliorate these forbidding conditions.

Acquisitions. In the "Random Notes from the Library" published in the August, 1952, issue of the College's *Transactions & Studies* will be found brief descriptions of a half-dozen or so of the library's historical acquisitions during the year. Another handful may properly be mentioned here:

16th Century

Ein Newes hochnutzlichs Büchlin von erkantnuss der kranckeyten der Augen, Sampt einer figur oder Anathomia eines augs wie es jnnwendig gestaltet. Volget in der andern colum, Auch erklärung der selbigen, mit anzeigung viler nutzlicher und bewerter hulff, als Purgation, Plaster, Collirien, Sieff, Pulver, Salben und augen wassern, wie mans machen und gebrauchen soll, einemjeden hausshalt nutzlich. Strassburg, Heinrich Vogtherr, 1538. *Purchased from the Paul Judd Sartain Fund.*

There are several points about this little treatise that may well justify a more complex note later on. For the present, let us recall that the first printed monograph in the field of ophthalmology was that by Benevenutus Grassus, printed in 1474, a copy of which has long been one of the most valued items in our collection of incunabula. According to Hirschberg, there were very few publications on this subject by learned physicians in the 16th and 17th centuries. He mentions, in this connection, perhaps too restrictively, only five writers: Leonhard Fuchs, Hieronymus Mercurialis, Vopiscus Fortunatus Plempius, William Briggs, and the anonymous author of our treatise. Of these, incidentally, the library has all of the editions cited except Fuchs' *Tabula oculorum morbos comprehendens* of 1538 (which Hirschberg early in this century said could not be found) and the allegedly spurious translation of it brought out by our printer, Vogtherr, a year later. The earliest of these were the Fuchs Latin *Tabula* and our *Büchlin*. Our treatise was issued again in 1539, which would seem to indicate that Vogtherr expected his alleged translation of Fuchs, published in the same year, to appeal to the learned physicians, our treatise to have the household use that its title suggests. As a matter of fact, Hirschberg says that our anonymous tract is the better of the two, and that its passage on cataract obviously influenced Georg Bartisch, whose strikingly illustrated *Augendienst* (1583) is also in our library.

The diagrammatic representation of the anatomy of the eye that is mentioned in the title has been reproduced, though with reduction, by Sudhoff in his *Tradition und Naturbeobachtung in den Illustrationen medizinischer Handschriften und Frühdrucke vornehmlich des 15. Jahrhunderts* (Studien zur Gesch. d. Med. 1, 24, Leipzig, 1907), but from the 1539, not our, edition. Sudhoff describes it as a close, almost completely slavish version of a diagrammatic model developed in the preceding century. It is said to be not identical with the one Vogtherr published in the German "Fuchs."

Just above the colophon, the printer advises us that he hopes soon to issue another and better work. Whether this refers to the "Fuchs," or to an anonymous little treatise on the urine that he published also in 1538 (a copy is in the library), we cannot say. A non-medical point of some interest is the appearance on the last page of a striking "studio" portrait of Vogtherr (who was also a painter, copper etcher, and wood engraver) used as printer's device. This is dated 1535 and gives his age as 47. In one of his non-medical books, published in 1539, the portrait device is dated 1537, while the age remains 47.

Miss Dorothy Schullian, Historical Division, Armed Forces Medical Library, has kindly verified that there is a defective copy of our 1538 edition in that library—some details of its entry under G. Vogther in the *Index-catalogue* (2d ser.) bringing the identification into question.

Cardanus, Hieronymus (1501–1596). Contradicentium medicorum libri. 2v in 1. Lyon, Seb. Gryphius, 1548. *Gift of J. Monroe Thorington, M.D.*

This is the third contemporary edition of this most famous of works on the contradictions of physicians to be welcomed to the library. It coincides with the recently renewed interest in the life and works of the controversial Milanese, as witnessed by the studies of Eckman (1946) and Bellini (1947), both in the library. It will be recalled that

Boerhaave, according to Haller, said of Cardano: Sapientior nemo, ubi sapit, dementior nullus, ubi errat—there is no one wiser, when he is wise; no one crazier, when he goes astray.

An inscription on the title-page of this copy is worthy of note. There is the signature *Julius Borgarutius*, and under it, the words: *Diripuisti dne Vincula mea*—Lord (or, in the secular sense, *Master*), thou has burst my chains asunder. If addressed to Borgarucci's compatriot and contemporary, we have a striking tribute to Cardano and probably this book of his. If the words have theological import, there is poignant suggestion of another sort. For Giulio Borgarucci was an Italian physician who went to England, prior to 1563, as a Protestant refugee. There he was incorporated M.D. in the University of Cambridge, 1572, and in the following year was made physician to the royal household for life. In London, he was a member of the Italian branch of the 'Stranger's Church'. There seem to be no medical publications recorded under his name. On the other hand, one of his three brothers (two of whom were also physicians) was the famous Prospero, professor of anatomy at Padua, who brought out the *Chirurgia magna* spuriously attributed to Vesalius. Prospero joined his brother in London during the plague of 1563, and in 1565 published at Venice a treatise, *De peste perbrevis tractatus*, which is dedicated to Giulio and the non-medical Borgarucci brother. A copy of this treatise is in the library. Cardano was supported in his last, difficult years by a pension from the pope.

17th Century

Heurnius, Joannes (1543–1601). Institutiones medicinae. Ed. altera. Leyden, J. Maire, 1627. *Gift of E. B. Krumbhaar, M.D.*

The Dutch physician Jan van Heurne is most often recalled for his having introduced clinical teaching at Leyden, having himself undergone such training at Padua. He was a prolific writer, fortunate in having a son (Otto), also a physician, who assiduously edited and published his father's works long after the latter's death. The library has a number of them, but lacked until now one of the separate editions of this work, which is said to demonstrate van Heurne's excellence as a teacher. Dr. Krumbhaar has noted in the book that the *Secunda medicinae pars*, beginning on p. 177, is pathology—the donor's prime field of interest. The volume contains also van Heurne's *Modus ratioque studendi eorum qui medicinae operam suam dicarunt*, which fortunately unites the two principal teaching texts of the Leyden professor.

A previous ownership again engages our attention. The initial preceding the signature "Willughby" is somewhat dubious. There is the notation "B:2:21" (which seems as though it might be a shelving notation); some writing deliberately and successfully later made illegible; and the date 1662. Of the two *DNB* Willughbys, both flourishing in 1662—Francis, the naturalist, and his uncle, Percivall, obstetric practitioner and writer—it is, of course, natural and agreeable to suppose that it was the latter, a friend of Harvey, who once owned this little vellum-bound book. The *DNB* says of him that "he was a man of high culture, powerful intellect, and great modesty. . . ." The library has his "Observations in Midwifery," not published in English until 1863.

Paracelsus (1493?–1541). Propheceyung, . . . Anno 1546. Vom Löwen auss Mitternacht. Dessgleichen D. Simonis Partlicii . . . Sternwarnung. 1631. (Sudhoff 340) *Gift of E. B. Krumbhaar, M.D.*

This prognostication, attributed somewhat questionably to Paracelsus (who, as indicated, died in 1541), has application to the Swedish king Gustavus II Adolphus ("Lion of the North," as he was called) during the Swedish period of the Thirty Years' War. It was apparently first published in 1622, our edition (Sudhoff tells us) unfortunately omitting the passages of alchemical and pharmacological interest.

Though Paracelsus gets the pride of place in this little pamphlet, seven of the 10 leaves are devoted to the astrological communication of Simeon Partlitz, of Spitzberg. Regarding

this "doctor of one and the other medicine, mathematician, count palatine, and poet laureate, etc.," information is not easily discoverable, with the exception of the fact that, in 1625, he published a "harmonical" system of medicine, in Latin, which the indefatigable Culpeper translated into English and published in 1654. Our library has neither of these, though the Armed Forces Medical Library evidently has both.

Smetius, Henricus, a Leda (1537–1614). Prosodia promptissima: quae syllabarum positione & dipthongis [sic] carentium quantitates . . . demonstrat. London, Stationers' Society, 1622.

Coincidence brings us next a work by one of the most pronounced anti-Paracelsists. Born in Flanders, graduated M.D. at Bologna (1561), a Calvinist refugee, Smet fled to Germany, where he held several important medical posts, culminating in the professorship of practical medicine at Heidelberg. From his youth, he had further distinguished himself as a poet and linguist. This is one of his published works in those fields, and the only work of his in the library. The *Miscellanea medica* that he published in 1611 is evidently exceptionally rare. Though we have a very good file of the transactions of the congresses of the Deutsche Naturforscher und Aerzte, it unfortunately lacks the *Festgabe* for the 62d congress, Heidelberg, 1889, which contains the original Latin text, with German translation, of Smet's work on the age and eminence of medicine.

Zacchias, Paulus (1584–1659). De affectionibus hypochondriacis libri tres—Italico idiomate primum . . . conscripti, nunc in Latinum sermonem translati ab Alphonso Khonn. Augsburg, Vidua Joh. Görlini, 1671.

This physician to Pope Innocent X, said to have been exceptionally learned in all branches of the arts and sciences, is regarded as the founder of forensic medicine. His *Quaestiones medico-legales*, which ran through many editions, was, of course, in the library; but we had had no edition of this work, on diseases supposedly arising from the liver, gall, and spleen, which was first published in the author's native tongue, in 1639. At least three editions in Italian were published up to 1651. It is significant that, twenty years later, it was found profitable to translate it into the language that could still give it the widest currency in all European countries.

The doctoral dissertation of Khonn, a physician of Ulm, was on the subject of catalepsy (Strassburg, 1662), which would help to explain his devotion to the large labor of translating this work on the "hypochondriac" diseases. In the manner of the time, the preliminary matter contains a number of verse tributes to the translator. Among them, one is interested to note, are three epigrams, in Latin, Greek, and Hebrew, composed by Athanasius Kircher, who, according to Garrison, was probably the first to employ the microscope in investigating the causes of disease. They were set down extemporaneously at Rome, we read, 15 Nov. 1670. It is tempting to read into the translator's letter to the benevolent reader a reference to these microscopical studies, in a passage in which we are cautioned to bear in mind the fact that sedulous investigators may daily pass over the obvious, as also may the expert industry of the anatomists, and, then, continued unflagging zeal in investigating the microcosm and in penetrating its inmost secrets may presently bring to light something new, and of great advantage to the Apollonian art, which was hidden from our author in his time, even though he was the most sagacious investigator of nature in other respects, as indeed from many others up to the present.

19th–20th Centuries

Coxe, Edward Jenner (1801–1882). 1) Notebook; medical commonplace book; 2) Materia medica commonplace book; 3) Scrapbook of his journal and newspaper communications. *Gifts of Mrs. T. Wistar Brown.*

Dr. John Redman Coxe, grandson of Dr. John Redman, a co-founder and first President of our College, is said to have been the first

to use vaccination in Philadelphia—his first subjects being himself and his twenty-three days old son, whose given names reflect the admiration of the father for the father of vaccination. Edward Jenner Coxe was graduated M.D. from the University of Pennsylvania in 1823. After some fifteen years of distinguished practice in Philadelphia and in Europe, interrupted intermittently by ill-health, he took up permanent residence in New Orleans. His life was productive—and certainly colorful—enough, one would think, for it to have received rather more attention from biographical historians than has been the case. These three very welcome historical sources would be found of no little assistance in such a study.

Hope, James (1801–1841). Principles and illustrations of pathological anatomy. "First American edition." Edited by L. M. Lawson. Cincinnati, Desilver and Burr; Lexington, A. T. Skillman & son, 1844. *Gift of E. B. Krumbhaar, M.D.*

This turns out to be something in the nature of a collector's item, as well as a guide to the casual use of the designation "first edition" by our 19th century publishers. The first English edition of the book (1833–34) is regarded as the first illustrated text-book of pathology and the direct ancestor of those in use today. The little-known present "First American" edition, not listed in the *Index-catalogue*, raises questions concerning the "First American Edition" published by Philadelphia's Lindsay and Blakiston, 1845, which *is* listed therein.

The two American "first" editions are substantially the same—that is, are made from the same plates, except for the title-pages. This copy of the Cincinnati edition, however, has, between the Index and the Description of the Plates, a second title-page. This follows the wording and arrangement of the English title-page (containing a good deal of additional matter and using the word morbid in place of pathological); the imprint is: "Cincinnati: Desilver and Burr. 1844"; on the verso of the title-page there is printed: "Cincinnati: E. Morgan & Co. Printers." Following this second title-page is a "Notice by the Editor" dated May, 1844, and the author's preface. Following the Table of Contents, at the front of the volume, is a "Preface to the First American Edition" dated November, 1844. The title-page of the 1845 Philadelphia edition differs considerably, apart from the imprint, from both title-pages of the Cincinnati-Lexington edition. Following it appear the author's preface and the two editorial notices from the Cincinnati edition, with the page numbers incongruously unchanged.

The American editor was Dr. Leonidas Moreau Lawson, of Cincinnati, who, in 1842, founded and thereafter edited the journal *Western Lancet*. With the help of its pages, it is possible to reconstruct in some part the curious history of this edition.

The August, 1844, issue of the *Western Lancet* carried the following notice: "*Hope's Pathological Anatomy:* First American Edition; edited by L. M. Lawson, M.D. This work is illustrated with forty-eight colored plates, accurately copied from the original. It will be completed before the first of November next. For the purpose of transmitting it by mail, it will be issued in four parts, which can be safely forwarded to any part of the country. Part I. now ready."

Then, in the issue of January, 1845, the following notice appeared: "Hope's Pathological Anatomy.—This work having been completed and bound, can be furnished to those who may wish to obtain it by applying to Messrs. Desilver & Burr, Cincinnati, and to C. Marshall, and C. S. Bodley & Co., Lexington. In consequence of the Editor's removal from Cincinnati, the work cannot be completed in *Parts*, as was originally contemplated, until the coming summer; therefore, those who have subscribed with the view of obtaining it in that form, cannot be supplied before the time above specified; but should they prefer buying the book bound, it can be obtained from the Messrs. Desilver & Burr, Cincinnati. Those

who have received Part I. have the privilege of returning it, if they wish to obtain the bound volume."

The sequence of events would seem therefore to be about as follows: The enterprising editor, with the cooperation of the Messrs. Desilver and Burr, and employing E. Morgan & Co. as printers, proposed to issue Hope's book in parts, the manner in which it had been issued in England; issued the first part, containing the English-model title-page, the editor's notice with the May date, and the author's preface; was then called to the chair of general and pathological anatomy and physiology in Transylvania University, and, since the printing of the book had been completed, decided to dispose of the matter by issuing the book as a bound volume—which was done, the edition being provided with a new title-page, a new editorial notice (dated November, 1844), and including, *in situ*, the title-page, the editorial note, and the author's preface that had gone out with the separately issued Part I.

It should be observed that the editor's May notice concludes as follows: "Note.—At the close of the work, a neat Title Page and a copious Index will be furnished." This might be taken to indicate that Part I, as issued separately, lacked a title-page—in which case, the work would have been not easily identifiable. The English-model title-page, however, was clearly printed before Lawson's call to Transylvania, since his chair there is not mentioned, whereas it is on the title-page of the bound volume. The answer, we believe, is in the word "neat." The English-model title-page is thickly populated with words set out in various sizes of type; the title-page furnished the bound volume is very much simpler—one might say, neater.

The book evidently quickly came to the attention of the Messrs. Lindsay and Blakiston, in Philadelphia. (There is a notice of the Cincinnati-Lexington edition in the July, 1845, number of the *American Journal of the Medical Sciences*.) These publishers obviously obtained the plates from Desilver and Burr, substituted a new title-page for the earlier two, carried over the notices and preface from the partial and complete Cincinnati publications without adjusting their pagination to the new position, and issued the book as a "First American Edition" under their own imprint.

It seems clear, therefore, that the first American edition of this historically interesting work was published not in Philadelphia, as many must have been led to suppose, but in Cincinnati; not in 1845, but a year earlier. It seems equally clear that there are not likely to be many copies of this genuine first American edition knocking about these days.

Mitchell, S. Weir (1829–1914), *Mitchell, John Kearsley* (1793–1868), and *Mitchell, John K.* (1859–1917). Miscellanea. *Gift of Mrs. Mitchell Macdonough.*

As has been noted by us at other times, the library's holdings of Mitchellana, the published writings excepted, are remarkably meagre in view of Weir Mitchell's almost proprietary devotion to the College for so many years. Many of his contemporaries, with far less reason to anticipate historical attention, did far more than he to provide the library with biographical source material, for which the library is eternally grateful. It is extremely grateful now for this cache of miscellaneous material from the holdings of the Mitchell family.

It must suffice here to name merely a few of the items of larger interest. Perhaps foremost is Weir Mitchell's diary for 1913, the year before his death at the age of 85. The entries are often brief and either trivial or cryptic, the palsied handwriting more difficult than ever; but the diary may, nevertheless, provide further illumination in modest ways. There is a typescript, with changes in Weir Mitchell's hand, of an address on the subject of François Villon, which appears, judiciously, not to have been published. The following quotation from it may be of some

interest: "I may add, for it may strike some of you, that the play 'Cyrano de Bergerac' [1897] has almost precisely the same plot as that of the poem which I invented [this word is crossed out but not replaced] and shall have the pleasure of reading to you this evening. It is probably a mere coincidence, for it is unlikely that the author [Edmond Rostand] ever saw my volume or knew that twelve years before I had anticipated the plot used in his play." There is an interleaved copy of the "Researches upon the venom of the rattlesnake", with notes in Mitchell's hand, letters and newspaper clippings dealing with the subject, original pencil drawings, quite possibly from the hand of Dr. John H. Packard, who did the plates for the work.

John Kearsley Mitchell is represented, in the matter of material new to us, by a "Proceedings of the R. W. Grand Lodge of Pennsylvania . . . on the death of the R. W. Grand Master, John K. Mitchell, M.D. Phila., 1858"; and by the "Order of exercises of the laying of the corner stone of The Masonic Hall (Chestnut above Seventh) on Monday, November 21st, 1853." The latter gives us the words of the Masonic Ode written by Dr. Mitchell. There is also an apparently unpublished manuscript poem on Philip Syng Physick, written, evidently, shortly after his death, in 1837, which may be attributed to this former student of Physick. A copy of his "Charge to the graduates of Jefferson Medical College of Philadelphia", 1850, bears the inscription: "For S. Weir Mitchell, M.D. with the regards of J. K. Mitchell". The tone, which, in view of the relationship of donor and recipient, may seem strangely remote, takes on a quite different and warmer color when we recall that S. Weir was then for the first time privileged to be addressed as M.D., having been a member of the class to which his father's charge was directed.

The J. K. Mitchell material consists largely of copies of his writings and inscribed copies of those of his father and grandfather. To him probably must be attributed a sheaf of typewritten introductions of speakers (C. K. Mills, Sen. Harry Lane, Prov. Smith, Dean E. H. Bradford, of Harvard, Alonzo Taylor) at a University of Pennsylvania Day banquet, circa 1915.

Finally, there should be noted two John Shaw Billings items. One is a typewritten, signed design for experiments that formed the basis of his, S. Weir Mitchell's, and D. H. Bergey's "Composition of expired air and its effects upon animal life", published as a Smithsonian Contribution to Knowledge, 1895. The other are typewritten, signed directions, written in 1893 for the Laboratory of Hygiene of the University of Pennsylvania, for an investigation of the effects of light upon the vitality and toxic properties of certain pathogenic bacteria.

Exhibits. There were two main historical exhibits during the year: the first illustrated the development of the herbal, and was intended as a complimentary gesture in the direction of the American Association for the Advancement of Science, which was meeting in the city; the second was a survey of the geriatric literature from early times to the present, the general subject being one that was discussed at a joint meeting of the College and the Philadelphia County Medical Society. Dr. Joseph T. Freeman, chairman of the committee of the County Society arranging the meeting, favored us with the loan, from his collection, of a number of rare items not to be found in the library. As usual, exhibits were prepared for the lectures on the history of medicine for students, sponsored by the Section on Medical History, and for the Section's own winter and spring meetings.

Publication. The following publication by the librarian drew largely upon the library's historical resources: The beginnings of American medical historiography, *Bulletin of the History of Medicine* **26:** 45–53, Jan./Feb., 1952.

W. B. McD., 2d

STATISTICAL SUMMARY

Inventory

	1952	1951
Total number of accessioned[1] items	181,473	179,566

	1952	1951
Incunabula	416	416
Manuscripts (including a few typescripts)	785	779
General	176,185	174,355
Accessioned pamphlets	4,087	4,016
	181,473	179,566

Total number of unaccessioned[1] items	323,492	322,445
Reports	27,065	26,916
Periodicals "reserve"[2]	8,932	8,526
Theses and Dissertations	56,667	55,828
Pamphlets and reprints	230,828	231,175
	323,492	322,445
Total number of current periodical publications regularly received	1,710	1,603
Portraits[3]	81,441	78,590

Distribution of This Material

	Accessioned Items	*Unaccessioned Items*
General Library (including the Lewis Library)	173,050	323,488
On permanent deposit:		
Gross Library	3,919	4
Parry Library of the Obstetrical Society of Philadelphia	217	0
Mütter Museum[4]	200	0
Accessioned pamphlets	4,087	
	181,473	323,492

Current Periodicals

	Purchased	*Exchange or Gratis*	*Total*
U.S.A.	310	358	668
Western European Continent	567	52	619
Latin America and West Indies	36	117	153
United Kingdom and Eire	112	33	145
Canada	5	29	34
Eastern European Continent	4	3	7
Asia	27	29	56
Africa	4	6	10
Pacific	4	14	18
Grand Total: 1952	1,069	641	1,710
Grand Total: 1951	983	620	1,603

[1] Accessioned items in this library comprise the total number of bound volumes and such unbound pamphlets as have been catalogued as separate bibliographical units regardless of their size.

There remain many thousands of unaccessioned pamphlets awaiting accessioning and cataloguing. A true quantitative and qualitative picture of the library's holdings can not be presented until this wealth of neglected material has been processed and duly registered in our 'accessioned', or 'volume', count.

[2] More-or-less complete duplicate volumes of periodicals.

[3] Including 119 oil, and 422 other, framed portraits in the care of the Committee on College Collections. The count of portraits represents the number of entries on the cards in the portrait catalogue. The entries represent, in turn, both loose portraits and those in books, many of them, of course, being merely different reproductions of a single original.

[4] The books of the Mütter Museum are not permitted to be removed from the College building.

New titles: A total of 72 periodicals new to the library was added in 1951–52. Forty-four of these were purchased; twenty-eight received in exchange or gratis. Fifty began with volume 1. The remainder of the increment indicated in the grand total represents journals which resumed publication or were added through the reestablishment of exchange and gift arrangements.

Separate Issues received, checked-in on the cards, and shelved totaled 15,322. In addition, thousands of duplicate issues were received, as usual; 406 of these were retained for our 'reserve' files, no attempt being made to count those held merely for exchange or other use.

Visitors to the Norris Room for the year totaled 4,413.

Readers' Use of the Library

Library Hours. The library was open on 287 (1951: 294) days during the academic year, from 9:30 to 9:30 on Mondays and Wednesdays; from 9:30 to 5:30 on the other weekdays. During the latter half of June, in July, August, and the first half of September the library was open from 1 to 9:30 on Tuesdays; from 9 to 5 on the other weekdays, except Saturdays, when it was closed. The library was closed for repairs June 23 to June 27. The following legal holidays were observed: Thanksgiving (beginning at 5:30 on the preceding evening), Christmas and New Year's (and the day preceding each), Memorial, Independence, and Labor Days.

Visitors

	Totals	*Reading Room*	*Periodicals Room*
1952:	13,804	9,391	4,413
1951:	13,320	8,708	4,612

Circulation

	Totals	*Intra-mural*[5]	*Extra-mural*	*Books*	*Journals*
1952:	62,804	55,294	7,510	13,055	49,749
1951:	61,936	54,447	7,489	---	---

Inter-library loans: The library sent 2,308 (1951: 2,342) volumes on inter-library loan to 108 (1951: 127) libraries in 23 (1951: 31) States and Canada and has borrowed 2 (1951: 32) volumes from 1 (1951: 3) library.

Photostats: 3,013 photostatic prints were furnished on request (1951: 2,142).

Acquisitions and Accessions

Accessioned Acquisitions:

1952: 2,025 volumes (1,327 by purchase; 560 by gift; 137 by exchange). (*Books:* 747; *Periodicals:* 1,276); 71 pamphlets.

1951: 2,100 volumes (1,492 by purchase; 471 by gift; 172 by exchange). (*Books:* 725; *Periodicals:* 1,375); 133 pamphlets.

Non-accessioned Acquisitions[6]*:*

1952: Reports (1951: 41).
839 Theses (1951: 651).
61 Miscellaneous items (1951: 135)

Donations

The donors for the past year number 246 (1951: 205). The library is indebted for large gifts of books, pamphlets, and unbound periodicals to the following donors: Dr S. Bellet; Boston Medical Library; Drs B. Chance, K. Chouké; Jefferson Medical College; Drs R. A. Kern, E. B. Krumbhaar; Lane Medical Library; Lea & Febiger; Dr G. E. Pfahler; Philadelphia County Medical Society; W. B. Saunders Co.; Smith, Kline & French Laboratories; Temple University School of Medicine; Woman's Medical College; Wyeth, Inc.

Among the corporate donors, too numerous to list in their entirety, were our neighboring publishing houses, which presented volumes of their own publication as follows: Blakiston Co., 22; F. A. Davis Co., 3; Lea & Febiger, 13; J. B. Lippincott Co., 5; W. B. Saunders Co., 59.

Other individual donors were as follows: Drs B. J. Alpers, J. H. Arnett, G. Baehr, H. Beerman; Rev. A. D. Bell; Drs R. S. Bookhammer, W. N. Bradley; Mrs T. W. Brown; Drs E. O. Brower, E. T. Crossan, D. M. Davis, F. C. Dickinson, L. I. Dublin; Mr D. I. Duveen; Drs C. B. Farr, F. Fraley, B. Freedman, E. M. Greenberg, J. G. Hand, A. M. Hellman, C. L. Jackson,

[5] The number of volumes consulted in the library includes only those supplied on demand. Readers have access to the bound volumes of periodicals and reference works kept on the shelves in the Reading Room; the Fellows, and occasionally others, by special permission have access to the book-stacks. There are, therefore, many volumes consulted of which no accurate record can be kept.

[6] As usual, not all the pamphlets, theses, and numbers of various journals listed as received had been checked for keeping or discard at the close of the library year.

J. V. Klauder, C. D. Leake, W. G. Leaman, Jr., S. Leopold, A. Levinson, D. Macfarlan, T. H. McGavack, E. A. Mallon, C. Mazer; Miss M. Milligan; Drs R. C. Moehlig, P. B. Molina-Castilla, C. W. Muckle, D. P. Murphy, M. L. Niedelman, C. M. Norris; Mr W. H. Oda; Drs W. Overholser, E. N. Packard; F. R. Packard Estate; Drs S. X Radbill, J. E. Rhoads, R. B. Roth, L. C. Scheffey, T. G. Schnabel, R. R. Scobey, P. H. Shaw; Prof. R. H. Shryock; Dr G. N. J. Sommer; Miss G. Stevens; Drs A. L. Stockler, J. M. Thorington, H. R. Viets, M. B. Wesson, I. J. Wolman, W. Zentmayer.

Exchanges

The *Transactions & Studies* was sent, either in exchange or as gift, to 254 organizations.

The library received a number of journal issues through the Medical Library Association Exchange and supplied duplicate journals to other libraries through MLA, UNESCO, and others.

Theses and dissertations to the number of 839 have been received on exchange from the following European schools of medicine: Universities of Amsterdam, Basel, Berlin, Bern, Copenhagen, Erlangen, Geneva, Giessen, Halle, Jena, Lausanne, Leiden, Liege, Louvain, Lund, Uppsala.

Work of the Cataloguers

	1952	*1951*
Accessioned items catalogued or recatalogued	681	670
Unaccessioned items and Fellows' reprints catalogued by author or by author and subject	190	209

The Staff

Librarian
W. B. McDaniel, 2d

Administrative Associate Librarian
Elliott H. Morse

Head Cataloguer
Miss H. Muriel Hodge

Assistant in Charge of the Reading Room
William K. Beatty

Assistant in Charge of the Periodicals Room
Mrs. Elizabeth F. Bready

Assistant Cataloguer
Miss Lillian Ceci

Secretary to the Librarians and General Assistant
Miss Kathryn Haegele

Photostat Operator and Page
Miss Margaret Greene

Pages
Miss Dorothy Minton
Miss Julia Carter
Miss Wilma Davis

Approved:
Truman G. Schnabel
Chairman

W. B. McDaniel, 2d
Librarian
Elliott H. Morse
Administrative Associate Librarian

Annual Report of the Committee on the Mütter Museum and College Collections

The Museum

The Mütter Museum was open to Fellows of the College, physicians, students and the general public from 9:30 to 1 and from 2:00 to 4:30, Mondays through Fridays, and on evenings of the Stated Meetings of the College it was open until 8:30 P.M.

The museum was visited by classes from the Woman's Medical College, Gillespie High School and a class of student nurses from Jefferson Medical College. The attendance was augmented by daily visits from individuals, bringing the total for the year to 1357.

Twenty-four articles on museum and College specimens prepared by the curator have appeared in *Philadelphia Medicine* and an article entitled *Our Old Spectacles* appeared in the February 1952 number of the College's *Transactions & Studies*.

The Sixty-fourth Thomas Dent Mütter lecture was given on December 5, 1951 by Louis H. Clerf, M.D., who spoke on *Historical Aspects of Foreign Bodies in the Air and Food Passages*. It was printed in the *Transactions & Studies*, June, 1952.

Mrs. Ella N. Wade was reappointed curator and clerk-technician for the year 1951–52.

Accessions to the permanent collection of the Mütter Museum for the year are as follows:

Presented by Mr. Francis G. Koehler through Dr. William M. McFadden:
Cupping set
Presented by Leon Solis-Cohen, M.D. and Paul S. Friedman, M.D.:
Urethral calculus
Presented by Douglas Murphy, M.D.:
Obstetrical forceps
Tri-valve vaginal speculum
Vectis
Trephine
Skull saw
Periosteum elevator
Trocar
Vaginal depressor
Presented by Mr. Edward Shippen Morris through C. Alexander Hatfield, M.D.:
Chest of old medicines that had been in the Shippen family for many years
Presented by Frederick O. Zillessen, M.D.:
Small instrument formerly used by Drs. Isaac Ott and Claude Bernard

R. Philip Custer
Chairman

The College Collections

Mrs. Ella N. Wade was reappointed custodian of College Collections for the year 1951–52.

The portrait of Joseph Leidy was relined and restored, and the one of John Ashhurst was cleaned and varnished by Mr. Frank Ireland. The portrait of Washington L. Atlee was restored by Mr. Fred Weber.

Accessions to College Collections were as follows:

Presented by J. Monroe Thorington, M.D.:
Medals commemorating the following:
Alphonse de Candolle
William Hunter
Rembert Dodoens
C.-M. de l'Épée, l'abbé
Malpighi
Adam Politzer
C. W. Hufeland
Richard Mead
Presented by George M. Coates, M.D.:
Eight pairs of old spectacles
Presented by Philip F. Williams, M.D.:
Cane formerly belonging to Robert M. Girvin, M.D. and John H. Girvin, M.D.
Presented by Burton Chance, M.D.:
Three silver votive offerings from Cuba

Five pairs of old spectacles
Keyser's ophthalmoscope
Dr. Edward Jackson's ophthalmoscope
Dr. John W. Croskey's ophthalmoscope
Risley's double prism formerly belonging to Clark Hermon Thomas, M.D.
A crab's eye
Seeds of Abrus praecatorius used as a substitute for the original crab's eye and donated by the Philadelphia College of Pharmacy

Presented by Mrs. Alfred Nelson:
Pair of old spectacles (1894)

Presented by T. Grier Miller, M.D.:
Oil portrait of T. Grier Miller, M.D., by Charles Baskerville

Presented by Louis H. Clerf, M.D.:
Two bronchoscopes

Presented by T. H. Bast, M.D. of the University of Wisconsin, through Douglas Macfarlan, M.D.:
Model of part of the otic labyrinth showing the otic duct system and the utriculo-endolymphatic valve discovered by Dr. Bast.

R. Philip Custer
Chairman

Report of the Publication Committee

This report covers the publication of 4th ser., vol. 19, nos. 3 and 4; vol. 20, nos. 1 and 2 of the *Transactions & Studies*.

These four numbers contained 194 printed pages, as against 183 in the preceding budgetary series of four numbers. The slight deficit incurred was charged against the small Burr Fund for Illustrations.

All but one of the endowed lectures were promptly made available to us in a form feasible for printing, and were as promptly put into print. The loss of the one lecture was compensated for by acceptance of a paper recommended by the Section on Public Health.

The re-activation of the Section on Medical History provided us with three viable papers, as we had hoped.

Permissions to re-publish. The Committee gave permission to Dr. George W. Thorn to re-publish extracts from his article in the February 1952 issue. The J. B. Lippincott Co. (*American Practitioner and Digest of Treatment*) was given permission to publish a condensed version of Dr. Charles C. Wolferth's paper that appeared in our April 1952 issue; and to publish extracts from Dr. Cadbury's and Mrs. Wade's historical papers. Lea and Febiger was given permission to use four illustrations (in the revision of Portis' "Diseases of the Digestive System") from the paper by Wolf and Wolff in our December 1948 issue. In all cases, permission was subject, as usual, to the authors' concurrence and to acknowledgement of source.

Coverage by Abstract Journals. Conscious as we are of the difficulties encountered in attempting to keep the *Transactions & Studies* up to par on so limited a budget, the Committee was also gratified to learn that the journal is covered by the following abstracting services: Abstracts of World Medicine; Biological Abstracts; British Abstracts, A. III; Bulletin of Hygiene; Chemical Abstracts; Excerpta Medica; Journal of the American Medical Association.

Finally, this Committee wishes to express their deep gratitude for and appreciation of the excellent work of the Editor.

David A. Cooper
Chairman

Annual Reports of the Sections*

General Medicine

The Section had 162 members. As usual, there were 7 meetings held during the year.

Abstracts of 27 out of the 28 presentations will be found in the *Transactions & Studies*.

Charles M. Thompson
Clerk

Medical History

The Section during 1952 was actively supported by 121 dues paying Fellows. The same staff of officers carried on the administrative duties for another year. Four meetings were held during January, February, March, and April. At the first of these in conjunction with the Woman's Medical College of Pennsylvania, we obtained as guest speaker, Dr. Kenneth J. Franklin, Professor of Physiology at St. Bartholomew's Hospital Medical College of London, England, who was at the time, visiting Professor of Physiology in the University of Illinois, and the American College of Physicians joined with us to help defray his travelling expenses.

At the second meeting, Dr. Joseph V. Klauder and Dr. E. J. G. Beardsley, Fellows of the College who have long been identified with the Section on Medical History and its work, participated in the program.

The third meeting was shared by two invited guest speakers, Dr. Abraham Levinson of Chicago and Dr. Edward H. Hume of New York City, both of whom have many friends in this city.

The fourth and final meeting of the season was a lecture sponsored by the Kate Hurd Mead Class of 1888 Fund of the Woman's Medical College of Pennsylvania. Dr. Chauncey D. Leake, Vice President and Dean of the University of Texas Medical Branch, was the guest speaker.

The attendance at these meetings was 63, 18, 60 and 49, respectively. Dr. and Mrs. William G. Leaman, Jr., again graciously entertained at their home before the first and last meetings. Subscription dinners preceded three of the meetings, while a collation was served after the other one. These ancillary gatherings not only provide good fellowship, but serve to stimulate interest in the subject matter of the day and give many of us an opportunity for intimate intercourse otherwise impossible these crowded, hurried days. The traditional recognition of the importance of the study of medical history by the Woman's Medical College of Pennsylvania in their continuing practical support of our efforts should not be overlooked. It might also be well to acknowledge here the encouragement given by the experienced counsel of our own Dr. E. B. Krumbhaar.

The course of six lectures to the students of the five medical schools of this city made possible by the financial support of all the medical schools was successfully carried out again this year with Dr. Shryock and Dr. Temkin of the Johns Hopkins Institute of the History of Medicine as the speakers. The total attendance this year numbered 1,274. The feasibility of expanding the teaching phases of the vast historical resources of the College in the history of medicine should be given serious consideration.

Our energetic librarian, as in the past, prepared timely and pertinent exhibits for each lecture. In addition, Mrs. Wade prepared exhibits from the collections of the Mütter Museum which also attracted a good deal of attention and served to lure at least some of the audience later to the College collections in general. Mr. Lentz, Librarian at Jefferson Medical College, also prepared a suitable exhibit each week at the library of the Jefferson Medical College to call the attention of the students to the coming lectures and at the same

* For the programs of the Sections in 1952, see the *Transactions & Studies*, vol. 20, no. 2, August, 1952, and elsewhere in this issue.

time remind them of their own resources in the field of medical history.

While not strictly an activity of our Section, it might be of interest to report also that a course of historical lectures is now delivered annually to the Department of Dermatology at the Graduate School of Medicine of the University of Pennsylvania. This course was arranged by Dr. Herman Beerman, Chairman of the Department, and members of our Section. Dr. John Porter Scott, Chairman of the Department of Pediatrics of the Graduate School of the University of Pennsylvania, this year similarly arranged a course on the history of pediatrics for the graduate students in his department and a member of our Section presented this series of lectures. These courses are very well received and attendance on the part of the class is mandatory.

The clerk's records, correspondence and all other documents belonging to the Section for 1948, 1949, and 1950, have been deposited in the library of the College and placed for safe keeping together with the older records of the Section.

SAMUEL X RADBILL
Clerk

OPHTHALMOLOGY

The total membership in the Section is 62, of whom 60 have paid their dues. There were seven meetings during the year, with an average attendance of 105.

The Fifteenth Annual de Schweinitz Lecture was delivered by Dr. Francis Heed Adler, of Philadelphia, November 20.

The Zentmayer Prize was awarded to Dr. Charles G. Steinmetz, 3d, for his paper "Mixed Cell Tumor of the Lacrimal Gland."

M. LUTHER KAUFFMAN
Clerk

OTOLARYNGOLOGY

The Section consists of 57 Fellows and 7 Honorary Members. There were six meetings during the year, the March meeting being held jointly with the Section on Otolaryngology of the New York Academy of Medicine. The attendance averaged about 30 Fellows and 36 guests.

The February meeting was in the form of a celebration dinner at the College to honor four of the outstanding otolaryngologists of the College: Drs. Ralph Butler, George M. Coates, Walter Roberts, and George B. Wood. They were made Honorary Members of the Section.

BENJAMIN H. SHUSTER
Clerk

PUBLIC HEALTH, PREVENTIVE AND INDUSTRIAL MEDICINE

There was an increase of 25 paid memberships during the year, bringing the total paid membership to 52, the overall membership to 74.

Of the two meetings held, the first was a combined meeting, in March, with Region #1, Pennsylvania Public Health Association, the attendance being so great that it was necessary to move from Cadwalader Hall to the larger Thomson Hall.

At this meeting, Dr. Pascal F. Lucchesi pointed out that the Albert Einstein Medical Center—involving the merger of the Jewish Hospital, the Northern Liberties, and the Mt. Sinai Hospitals—would bring about a better, more efficient and more economic service to the community. Ultimately it is hoped to add the other units of the jurisdiction of the Federation of Jewish Charities, namely, Willow Crest (convalescent home), Eagleville Sanatorium, Philadelphia Psychiatric Hospital, and the Community Health Center. Expansion of services and affiliation with medical schools is under way. The Southern Division is already affiliated with Hahnemann Medical College and the Northern Division with Temple University School of Medicine. A research program is being set up by the research committee. The out-patient departments are being expanded. A home care program is contemplated, including medical care, nursing, housekeeping, physical therapy, occupational therapy, etc. The Old Folks Home of the Northern Division is being moved into a new

Old Folks Home located at York Rd. and Somerville. Medical care for this division will be integrated with that rendered by the Albert Einstein Medical Center.

Dr. Joseph A. Langbord, after tracing the history of labor medicine, outlined the program sponsored by the Philadelphia Men's Outer Apparel Industry and the Philadelphia Branch of the Amalgamated Clothing Workers Union of America, which is offered as a project in the better distribution of modern medical care to those in the low and moderate income brackets. It provides preventive, diagnostic and specialist service to ambulant worker-patients, in addition to a wide coverage for catastrophic ailments, hospitalization, surgical and obstetrical fees, plus plant emergency dispensaries, etc. Cooperation with referring family physicians is emphasized. An educational program is promoted.

All initial patients are processed by an internist who allots 45 minutes for the first examination. On completion of the medical history and physical examination, the patient is referred to the clinical laboratory for routine urinalysis, complete blood count, serology, and photofluorography. All women receive a routine gynecologic examination. Specialist services are requested as indicated. Treatment is furnished free. Medical records are under the supervision of a registered medical record librarian. Between May 7, 1951 and March 1, 1952, 5,276 patients availed themselves of the Center's services. 1,680 were referred by a physician. 3,596 came on their own accord. The annual budget is $350,000. The source of funds for operation is a voluntary payroll assessment of ¾ of 1% assumed by the Industry.

The second meeting, held in November, drew an audience of 80, in addition to the participants.

Dr. August H. Groeschel emphasized the objects of an Out-patient Department as: prevention of disease, medical patient care, medical research, and medical education. He recommended the following improvements for the average Out-patient Department: improvement in coordination, including unit record systems, review of patients by a general physician who will act in lieu of a family physician and who will see consultants with these patients at the time they report to the clinic. Medical work in the Out-patient Department should be viewed as a privilege rather than a chore by the medical staff. Arrangement should be available for private physician referrals for diagnostic workup where patients cannot afford such studies. Reports should, of course, be made to the private physician, and no attempt should be made on the part of the hospital to hold the patient.

As moderator of the panel discussion on the relationship of voluntary health agencies to the medical profession, Dr. W. Edward Chamberlain pointed out that the medical profession has an intense interest in voluntary health agencies.

Dr. Julius Wilson covered the historical approach of these organizations as represented by the National Tuberculosis Association, which will be 50 years old in 1954. Their pattern combined medical and lay individuals. Dr. Wilson pointed out that the N. T. A. has taken a large role in improving the accuracy of death reports by pointing out the shortcomings of following tuberculosis thru mortality data rather than morbidity data. It has sponsored such researches and studies that led to the Franyhan ratio of 9 cases of tuberculosis per reported death, and is at present sponsoring mass x-ray surveys as well as evaluations of current infection rates as estimated by the tuberculin test.

Dr. Samuel Bellet stated that the American Heart Association, though beginning only in 1920, is now raising 3 or 4 million dollars a year, a good deal of which goes toward research. Fellowships are endowed and the Association maintains established investigators with the purpose of supporting individuals who show promise early so that they may not only explore the possibility of a career in research and cardiac disease, but, in the case of career investigators, be given support throughout life.

Dr. Thomas Nealon, Jr., outlined the set-up of the American Cancer Society and explained its financial structure. He stated that the Philadelphia group offers six cancer fellowships paying $3,300 a year, one in each teaching hospital and one at Philadelphia General Hospital. The National organization also has 88 Cancer Fellows in 42 different institutions in this country. Six of these are in Philadelphia (three at Jefferson and three at the University of Pennsylvania). Since the beginning of the program, 349 Fellows have been trained and, without exception, all have remained at teaching institutions or have gone on to smaller institutions to act as a nucleus for cancer interest. Fellowships are also sponsored in Exfoliative Cytology for 2 to 12 months. The journal *Cancer*, with its circulation of 6,000, is supported. A series of monographs has been published to aid the general practitioner in earlier diagnosis of cancer of a particular site. These are sent to 186,000 physicians and to senior medical students.

Dr. Burton Chance, Jr., representing the National Foundation for Infantile Paralysis, called attention to the increasing incidence of poliomyelitis and explained the financial structure together with the service project which helps the doctor with care, the family with finances and the hospital with equipment.

KATHARINE R. BOUCOT
Clerk

Transactions of the Sections

SECTION ON GENERAL MEDICINE

28 April 1952

Abstracts 1–3, below.[1]

26 May 1952

ALLERGY TREATMENT IN NASAL POLYPOSIS. Louis Tuft, M.D., and George I. Blumstein, M.D. (Discusser: Karl M. Houser, M.D.) (*Abstract 4, below*)

THE ETIOLOGY OF GENERALIZED ANHIDROSIS. Walter B. Shelley[2], M.D. (Discusser: John P. O'Brien[2], M.D.) (*Abstract 5, below*)

THE USE OF THE OXIMETER IN CARDIOVASCULAR DISEASE. Raymond Penneys[2], M.D. (Discusser: Samuel Bellet, M.D.) (*Abstract 6, below*)

THYROTOXICOSIS WITH HYPERCALCEMIA. Russell S. Boles, Jr.[2], M.D., and Edward Rose, M.D. (Discusser: F. William Sunderman, M.D.) (*Abstract 7, below*)

27 October 1952

TREATMENT OF CUSHING'S DISEASE WITH HIGH DOSAGE OF PITUITARY IRRADIATION. F. Curtis Dohan, M.D., Edward Rose, M.D., Nancy Boucot[2], M.D., and Richard Chamberlain, M.D. (Discusser: Karl E. Paschkis, M.D.) (*Abstract 8, below*)

CLINICAL FEATURES OF EMPHYSEMA CORRELATED WITH PULMONARY FUNCTION STUDIES. Peter A. Theodos, M.D. (Discusser: Martin J. Sokoloff, M.D.) (*Abstract 9, below*)

THE USE OF FRACTIONAL EPIDURAL BLOCK IN THE MANAGEMENT OF ACUTE PANCREATITIS. J. Edward Berk, M.D., and Le Roy W. Krumperman[2], M.D. (Discusser: Robert D. Dripps, M.D.) (*Abstract 10, below*)

CARDIOSPECTOGRAMS—A PRELIMINARY REPORT. George D. Geckeler[2], M.D., and William Likoff[2], M.D. (Discusser: Charles C. Wolferth, M.D.) (*Abstract 11, below*)

24 November 1952

STUDIES ON THE EFFECT OF THYROID ACTIVITY ON GASTRIC SECRETION IN THE RAT. David C. H. Sun[2], M.D., Harry Shay, M.D., and Margot Gruenstein[2]. (Discusser: Edward Rose, M.D.) (*Abstract 12, below*)

THE USE OF THE ARTIFICIAL KIDNEY. L. W. Bluemle, Jr.[2], M.D., L. D. Anderson[2], B.S., and J. R. Elkinton, M.D. (Discusser: Francis C. Wood, M.D.) (*Abstract 13, below*)

PASSIVE TRANSFER OF TUBERCULIN SENSITIVITY TO PATIENTS WITH SARCOIDOSIS. Frederick Urbach[2], M.D., Maurice Sones, M.D., and Harold L. Israel, M.D. (Discusser: Herman Beerman, M.D.) (*Abstract 14, below*)

STUDIES OF THE CEREBRAL HEMODYNAMICS AND METABOLISM IN CONGESTIVE HEART FAILURE. Paul Novack[2], M.D., Bernard GOLUBOFF[2], M.D., Leonard Bortin[2], M.D., Alvin Soffe[2], M.D., and Henry A. Shenkin[2], M.D. (Discusser: Samuel Bellet, M.D.) (*Abstract 15, below*)

SECTION ON MEDICAL HISTORY

Fifth Series of Lectures for Medical Students: 1952

I. INTRODUCTORY: The Meaning and Values of Medical History. Richard H. Shryock[2], PH.D. (Oct. 20)

II. GREEK MEDICINE. Owsei Temkin[2], M.D. (Oct. 27)

III. RENAISSANCE MEDICINE. Dr. Temkin. (Nov. 3)

IV. 17TH AND 18TH CENTURY MEDICINE. Dr. Temkin. (Nov. 10)

V. 19TH AND 20TH CENTURY MEDICINE. Dr. Shryock. (Nov. 17)

VI. SOCIAL ASPECTS OF MEDICAL HISTORY. Dr. Shryock. (Nov. 24)

[1] For the complete program, see the Trans. & Stud. **20**: 70–71, Aug. 1952.

[2] By invitation.

SECTION ON OPHTHALMOLOGY[3]

23 October 1952

(Pre-meeting exhibition of spectacles and ophthalmic instruments from the Mütter Museum, Mrs. Ella N. Wade, *curator*)

ORBITAL IMPLANT. Wilfred E. Fry, M.D.

THE USE OF NEWER ANESTHETIC DRUGS IN OPHTHALMOLOGY. H. H. Stone[2], M.D. (Discusser: Edmund B. Spaeth, M.D.)

MONOCULAR APHAKIA. Alfred Cowan, M.D. (Discusser: M. Luther Kauffman, M.D.)

20 November 1952

PATHOLOGIC PHYSIOLOGY OF STRABISMUS. Francis Heed Adler, M.D. (*Fifteenth Annual de Schweinitz Lecture*)

18 December 1952

A CASE OF BULLOUS KERATITIS. Harold D. Barnshaw, M.D. (Discusser: Alfred Cowan, M.D.)

THE TREATMENT OF CORNEAL OPACITIES BY DESICCATION. William Hart[2], M.D., and Louis Hinman[2], M.D. (Discusser: Glen G. Gibson, M.D.)

LONG LASTING LOCAL ANESTHETIC AGENTS IN OCULAR SURGERY. Harold G. Scheie, M.D., and Richard Ellis[2], M.D. (Discusser: James Eckenhoff[2], M.D.)

SECTION ON OTOLARYNGOLOGY[4]

16 April 1952

MENIERE'S SYNDROME AS AN EXPRESSION OF NUTRITIONAL DISTURBANCE. Miles Atkinson[2], M.D. (Discussers: Thomas E. Machella, M.D.; Joseph C. Yaskin, M.D.)

19 November 1952

FRONTAL SINUS LESIONS. Fred Harbert[2], Capt., MC, USN, W. C. Livingood[2], Comm., MC, USN, and B. Eberly[2], Lt. Comm., MC, USN.

17 December 1952

Case Reports

LATERAL SINUS THROMBOSIS—MASTOIDITIS AND SINUS THROMBOSIS MASKED BY PENICILLIN THERAPY; OPERATION AND RECOVERY. David Myers, M.D.

LARYNGOCELE. John J. O'Keefe, M.D.

ETHMOID SINUS. Oscar V. Batson, M.D., and M. Kostowiecki[2], M.D.

GLOMUS JUGULARE. Charles E. Towson, M.D.

LABYRINTHITIS, WITH SEQUESTRATION OF THE LABYRINTH. M. Valentine Miller, M.D., and Thomas F. Furlong, Jr., M.D.

SECTION ON PUBLIC HEALTH, PREVENTIVE AND INDUSTRIAL MEDICINE

10 November 1952[5]

THE HOSPITAL ADMINISTRATION LOOKS AT THE OUT-PATIENT DEPARTMENT. August H. Groeschel[2], M.D. (Discusser: Kendall A. Elsom, M.D.)

Panel Discussion: The Relationship of Voluntary Health Agencies to the Medical Profession. Moderator: W. Edward Chamberlain, M.D.

EPIDEMIOLOGICAL STUDIES. Julius Wilson[2], M.D.

RESEARCH PROJECTS. Samuel Bellet, M.D.

PROFESSIONAL EDUCATION. Thomas F. Nealon, Jr.[2], M.D.

SERVICE PROJECTS. Burton Chance, Jr., M.D.

ABSTRACTS

Abstract 1

MILIARY TUBERCULOSIS OF THE LIVER (PROVED BY BIOPSY) WITH RECOVERY. Edward E. Holloway, M.D.

M. C., a twenty-three year old married colored female with a retroperitoneal mass, no peripheral adenopathy, sick for approximately nine months with bouts of chills and fever

[3] Abstracts of the presentations at this Section customarily appear in the *American Journal of Ophthalmology* and the *A.M.A. Archives of Ophthalmology.*

[4] Abstracts of the presentations at this Section customarily appear in the *A.M.A. Archives of Otolaryngology.*

[5] For a summary of presentations at this meeting, and at the meeting on 31 March 1952, see the Annual Report of the Section, published in this issue.

with remissions. Splenomegaly and hepatomegaly were not observed. There was considerable weight loss over this same period. X-rays of the chest were negative. The red blood cell count and hemoglobin determinations were compatible with an iron-deficiency anemia. The white blood cell count was normal. A study of the bone marrow revealed a 5% plasma cell count. A tuberculin test, 1st strength, revealed a three plus reaction. A urinalysis was negative . . . no protein was found. Retrograde studies of the kidney revealed normal findings. The cephalin flocculation was three plus in twenty-four hours. The BSP . . . 15% dye in thirty minutes. A study of the plasma proteins revealed the globulin fraction to be 5.74 and the albumin fraction to be 3.78. A fasting blood sugar was normal. The serum amylase was 122 milligrams per cent. The alkaline phosphatase was 6.77 Bodansky units. The cholesterol and esters were normal. There was no evidence at any time of chemical or clinical jaundice. The sedimentation rate was 56 millimeters in sixty minutes. There was non-visualization of the gallbladder. Agglutinations for obscure febrile entities were negative. X-rays of the skull were negative. A GI series was negative. The calcium was 12.5. The phosphorus was 2.5. A serum lipase was .85 units. A laparotomy revealed a mass of partially calcified and caseous lymph nodes enveloping the pancreas. The liver surface was studded with tubercules and the mesenteric nodes were caseous. Biopsy of the liver revealed the presence of miliary tubercules. Lymph node biopsy revealed evidence of caseous tuberculosis. Acid fast bacilli were found in the caseating lymph node. The patient was given 12 grams of PAS daily and 1 gram of Streptomycin twice a week for four months, during which time the patient gained twenty-four pounds and remained completely afebrile and asymptomatic. During the latter stages of therapy the patient stated that she experienced a numbness in the side of the face after the injection of Streptomycin, suggesting the possibility of fifth nerve toxicity, which to our knowledge has not been noted before.

Abstract 2

THE SPLENIC FLEXURE SYNDROME MASQUERADING AS ANGINA PECTORIS. Harvey J. Dworken, M.D., Thomas E. Machella, M.D., and Fructuoso J. Biel, M.D.

A symptom complex, superficially resembling angina pectoris, was evaluated in a group of 40 patients. Its manifestations consist of pain or discomfort in one or more of the following areas: the left upper quadrant of the abdomen, the precordial area, chest, left shoulder, neck or arm. It is sometimes associated with a sensation of choking, shortness of breath, palpitation and other anxiety symptoms.

The attacks, in the majority of instances, are precipitated by emotional disturbances associated with constipation, and are relieved by the expulsion of feces or flatus.

Evidence that the symptoms are caused by distention of the splenic flexure consists of 1) the visualization of gas in that area during attacks, 2) the absence of gas during asymptomatic intervals, and 3) the reproduction of symptoms by distention of the splenic flexure by air-inflation of a balloon-tipped tube introduced through the rectum.

It is believed that the symptom complex is a manifestation of spastic colon, and that its recognition and appreciation are important in the differential diagnosis of coronary artery disease.

Abstract 3

A NEW TEST FOR VASOPRESSOR SUBSTANCES IN HYPERTENSION. David B. Fishback, M.D.

A new test for increased vasopressor substances in blood serum from hypertensive patients is presented.

The normal circulation time was determined in young white female rabbits by injecting ½ cc. of 20% sodium fluorescein into the marginal vein of the ear. Using a portable ultraviolet light plus filter, a bright yellow color was noted in the conjunctiva in 5 to 6 seconds. Adrenalin, pituitrin, and hypertensin, in small doses, prolonged the rabbit circulation time to 9 to 55 seconds. This was probably due to peripheral vasoconstriction in the rabbit.

Three cc. of *human* blood serum was injected

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into the ear vein of a rabbit; two minutes later, the animal's circulation time was determined. Less than 7.5 seconds was considered normal; longer than that, abnormal. Blood from normotensive cases showed normal results in over 80% of cases. Blood from benign hypertension cases gave abnormal results in 80% of cases. Malignant hypertension cases usually showed only slightly elevated circulation times in the rabbit; and in the terminal phase of malignant hypertension, the circulation time was often normal. (Probably less vaso-constrictive substances in the blood of advanced malignant hypertension cases.)

Abstract 4

ALLERGY TREATMENT IN NASAL POLYPOSIS. Louis Tuft, M.D., and George I. Blumstein, M.D.

In 1933 Kern and Schenck showed conclusively that allergy was the outstanding etiologic factor in benign nasal polyposis and suggested allergy treatment as a prophylactic measure. Although the allergic etiology was generally accepted, subsequent clinical experience showed an apparent disregard of the advice about treatment, especially by the otorhinologist, for in most instances such patients have their polyps removed surgically without anything being done to determine the cause or to prevent a recurrence. The present report represents a clinical study of 156 patients with mucous nasal polyps, often associated with nasal or bronchial form of respiratory allergy, in whom allergy studies and treatment was given. Review of this data offers definite additional evidence of the allergic etiology of this condition and also shows that untreated patients have a greater tendency to develop complicating asthma. This was especially true in those with multiple polyps. The present survey also showed that appropriate and long-continued allergy treatment, including both specific methods and drug therapy, was instrumental in reducing definitely the recurrence of the polyps both in those with single as well as in those with multiple polyps and in lessening the tendency toward complicating asthma. Best results were obtained in those patients with specifically determinable allergies—the sensitive group—and poorest results in those with undeterminable allergies—the non-sensitive group. Fortunately, the latter made up only about 20% of the total. Most of these failed to respond not only to allergy treatment but to rhinologic measures as well. In general, our results definitely show the value of allergy treatment in nasal polyposis especially as a prophylactic measure.

Abstract 5

THE ETIOLOGY OF GENERALIZED ANHIDROSIS. Walter B. Shelley, M.D.

A greater awareness of the possibility of anhidrosis can be attained by an appreciation of the common causes of such a disturbance. From the general medical standpoint, only widespread anhidrosis is of thermo-regulatory significance. From the etiologic standpoint, such an anhidrotic state may arise as a result of changes either in the nervous system or in the sweat gland unit itself. Damage to the hypothalamus or to the descending pathways in the brain stem or upper spinal cord is always reflected by generalized anhidrosis. This is dramatically seen in heat stroke. Widespread disturbance of the sympathetic nervous system may be seen in patients with orthostatic hypotension, and in these individuals again anhidrosis may be present. Various drugs such as atropine and the newer autonomic blockage agents when given in high dosage have the effect of eliminating the sympathetic control of the sweat gland with consequent anhidrosis.

Turning to the sweat gland itself, generalized anhidrosis may be seen in patients with congenital ectodermal defects. In these individuals the sweat glands are universally absent. Another feature to be appreciated is the fact that a severe generalized dermatitis may cause widespread destruction of the sweat gland. This is seen in patients who had severe atabrine dermatitis. Finally, anhidrosis may result from simple obstructive plugging of the sweat gland. This is termed sweat retention anhidrosis, and was seen commonly in servicemen in

the tropics. It is a sequel to severe repeated bouts of prickly heat. Sweat retention anhidrosis is also seen in many generalized dermatitides in which keratinous plugs form in the sweat ducts.

Anhidrosis can not always be categorized from an etiologic standpoint. In many instances the site of disturbances is an indeterminate one. Newborn infants, and especially those born prematurely, may show generalized anhidrosis for several days or weeks. Patients with severe cardiac decompensation often show markedly reduced sweating function. Many severe internal medical problems cause widespread anhidrosis, and this accounts for the failure of these patients to tolerate the effects of a warm environment.

Abstract 6

THE USE OF THE OXIMETER IN CARDIOVASCULAR DISEASE. Raymond Penneys, M.D.

Experiences with the Millikan oximeter, an instrument which measures photoelectrically changes in the blood arterial oxygen saturation of the intact human ear, in patients with cardiovascular disease are summarized: (1) The "induced anoxemia test" for coronary artery disease is standardized, in normal subjects, according to the level of the arterial saturation and its use in patients with suspected coronary artery disease is illustrated (Circulation **4:** 190, 1951). (2) The saturation rise with O_2 inhalation, normally less than 5%, is used as an index of hypoxemia and is correlated with the clinical findings in congestive heart failure, asthma, and related conditions (Bull. Johns Hopkins Hosp. **90:** 192, 1952). (3) The rapid, and often diagnostic, saturation changes in some patients with Cheyne-Stokes respiration or with exercise, are detected with the oximeter. (4) Application to cardiac patients of the "lung-to-ear" circulation time, obtained by noting the first increase in saturation immediately after beginning O_2 inhalation, is described.

Abstract 7

THYROTOXICOSIS WITH HYPERCALCEMIA. Russell S. Boles, Jr., M.D., and Edward Rose, M.D.

The purpose of this report is to describe two patients in whom thyrotoxicosis was associated with hypercalcemia and hypercalciuria. In both cases, the atypical onset and clinical course complicated the problem of diagnosis.

The clinical courses were dominated by nausea, vomiting, dehydration, muscular weakness, and irregular fever. The finding of hypercalcemia, hypercalciuria, and in one of the patients, skeletal decalcification, caused the diagnosis of hyperparathyroidism to be considered.

In the first case, the presence of thyrotoxicosis was not suspected until the sharp postoperative reaction first suggested an incipient thyroid storm. The second patient was in a critical state of dehydration and malnutrition when first seen. Both patients showed marked subjective and objective improvement following antithyroid therapy (respectively I_{131} preceded by a short course of stable iodine, and propylthiouracil followed by subtotal thyroidectomy). In our cases, there was no evidence to suggest Vitamin D intoxication, abnormal intake of calcium or alkali, or any of the systemic diseases accompanied by hypercalcemia.

Similar cases previously described have been cited. The occasional masking of thyrotoxicosis by subjective and objective findings associated with hypercalcemia and simulating hyperparathyroidism has been discussed.

Abstract 8

TREATMENT OF CUSHING'S DISEASE WITH HIGH DOSAGE OF PITUITARY IRRADIATION. F. Curtis Dohan, M.D., Edward Rose, M.D., Nancy Boucot, M.D., and Richard Chamberlain, M.D.

Six patients with clinical and laboratory evidence of Cushing's Syndrome (not due to adrenal tumor) have been treated with an initial course of 3,700 to approximately 5,000 tissue roentgens during the past four years.

These results have been compared with six patients previously treated with an initial course of x-ray therapy of less than 1,200 tissue roentgens. In the group treated with the higher initial dosage, four have shown an excellent clinical response and have remained in remission for the periods of observation (18 to 42 months). One patient had a fair to good response but still shows mild anxiety and a slightly elevated systolic blood pressure. Purple striae disappeared in these five patients, the glucose tolerance improved markedly or became normal, the weight loss was marked, menses returned, the psychiatric symptoms became minimal. However, in one patient so treated, there was no response within two years. Psychiatric disturbances were so marked that prolonged hospitalization was necessary. In the six patients treated with smaller initial doses, only three showed slight temporary improvement. It is concluded that further trial of pituitary irradiation, in the higher dosage range, is warranted in patients with Cushing's Syndrome, not due to adrenal cortical tumors. However, the potential dangers to nervous tissue of high dosage irradiation must be kept in mind.

Abstract 9

Clinical Features of Emphysema in Anthracosilicosis Correlated with Pulmonary Function Studies. Peter A. Theodos, M.D.

The degree of emphysema in an unselected group of 1,000 hard-coal miners has been evaluated by clinical means and correlated in some 500 cases with physiological studies.

No relationship exists between the age, length of underground exposure, the stage of silicosis and the degree of emphysema. There was poor correlation with the appearance of the chest, the degree of chest expansion and the response to exercise. A more reliable index may be obtained by the ratio between the various diameters of the chest and by the degree of diaphragmatic motion observed fluoroscopically.

Abstract 10

The Use of Fractional Epidural Block in the Management of Acute Pancreatitis. J. Edward Berk, M.D., and Le Roy W. Krumperman, M.D.

Since July, 1950, fractional epidural block has been used 15 times in 13 patients with severe acute pancreatitis. Pain was effectively relieved in 11 of the 13 patients, two of whom were treated on two different occasions. Despite the remarkable relief of pain effected by this procedure, there was no evidence indicating that the disease process per se was significantly altered. It is concluded that fractional epidural block should be considered a useful adjunct to but not a substitute for other therapeutic measures in severe acute pancreatitis.

Abstract 11

Cardiospectrograms—A Preliminary Report. George D. Geckeler, M.D., and William Likoff, M.D.

(1) A description and illustration of a sound spectrogram; (2) Development of spectrograms in speech analysis and other fields; (3) Equipment used; (4) Cardiospectrograms—description and illustrations showing some normal and abnormal heart sounds and murmurs and the characteristic patterns of each; (5) Possible future application of this method and information which it may furnish.

Abstract 12

Studies on the Effect of Thyroid Activity on Gastric Secretion in the Rat. David C. H. Sun, M.D., Harry Shay, M.D. and Margot Gruenstein.

Using the rat preparation developed in our laboratory, we studied the effect of experimental hypothyroidism upon gastric secretion. Three types of experiments were devised. In one, hypothyroidism was produced by total thyroidectomy. Because of obvious technical reasons, the parathyroid glands were also removed. The mock animals were treated exactly alike except that in the latter, thyroid and parathyroids were "handled" but not re-

moved. Effects on gastric secretion were studied six and eight weeks after operation. In another, radioactive iodine was injected; and in the third, thiouracil was supplemented in the diet. The control animals were selected in the same body weight range. The radioactive animals were kept alive for eight weeks and the thiouracil animals for eight weeks and twelve weeks respectively. At the end of the experimental period, the gastric secretion was studied in the same manner in all groups. After proper starvation, the pylorus was ligated and the stomach was lavaged with saline and emptied completely. Four hours after lavage, the animal was sacrificed and the gastric contents were collected quantitatively. These were measured and analyzed for free and total acidity, pH and pepsin concentration when enough material was available. In addition, blood samples were collected and analyzed for cholesterol, calcium and phosphorus. The results showed that in animals six weeks after complete thyroparathyroidectomy, there was significant depression in the volume but no difference in free acid concentration and total acid output of the gastric secretion as compared with the mock animals. However, significant depression in the gastric secretion was observed in animals eight weeks after complete thyroparathyroidectomy, and in animals treated with radioactive iodine or thiouracil. In animals where partial thyroparathyroidectomy was done, no change was found in the gastric secretion. No correlation was found between serum cholesterol or calcium levels and change in total acid output of the gastric secretion within the experimental groups.

Abstract 13

THE USE OF THE ARTIFICIAL KIDNEY. L. W. Bluemle, Jr., M.D., L. D. Anderson, B.S., and J. R. Elkinton, M.D.

Extracorporeal hemodialysis by means of an artificial kidney may be of great clinical value in the treatment of patients with acute temporary renal failure, particularly those doing poorly on conventional management. This procedure has also been used successfully in the rapid elimination of diffusible poisons, such as barbiturates and salicylates, in preparation of the chronic uremic patient for surgery and, more recently, in the removal of water from over-hydrated patients.

An illustrative case of acute renal failure following incompatible transfusion is presented in which dialysis with the Skeggs-Leonards dialyzer was performed on the 13th day of severe oliguria. Following the procedure, there was subjective improvement with clearing of sensorium. Sixty grams of urea were removed over a six-hour period with a consequent decrease in serum urea nitrogen from 125 mgm to 70 mgm per 100 ml. Amelioration of metabolic acidosis was noted in that blood pH rose from 7.26 to 7.34, serum CO_2 from 18 to 25 mM/l. and buffer base from 37 to 43 mEq.

Since the patient was edematous before dialysis, 1200 cc. of water were removed from blood circulating in the dialyzer by means of a high hydrostatic pressure gradient across the cellophane membrane. Concomitantly, respiratory rate fell from 36 to 16, dyspnea disappeared and pulmonary rales present before dialysis were no longer audible.

Diuresis ensued four days following dialysis and the patient thereafter recovered uneventfully.

Abstract 14

PASSIVE TRANSFER OF TUBERCULIN SENSITIVITY TO PATIENTS WITH SARCOIDOSIS. Frederick Urbach, M.D., Maurice Sones, M.D. and Harold L. Israel, M.D.

Passive transfer of tuberculin sensitivity to tuberculin-negative controls was accomplished with the method of Lawrence.

Tuberculin sensitivity was similarly transferred to 6 tuberculin-negative patients with sarcoidosis.

The diminished reactivity of patients with sarcoidosis has been variously explained by the occurrence of anticutins, excessive antibody formation and diminished antibody production.

The failure to demonstrate anticutins or other specific inhibiting factors to the tuber-

culin reaction does not exclude tuberculosis as a cause of sarcoidosis, but does serve to abolish one of the hypotheses on which the belief in a tuberculous etiology has been based. These observations are in better accord with the concept that tuberculin anergy in sarcoidosis is non-specific and due to involvement of the reticuloendothelial system by the disease.

Abstract 15

STUDIES OF THE CEREBRAL HEMODYNAMICS AND METABOLISM IN CONGESTIVE HEART FAILURE. Paul Novack, M.D., Bernard Goluboff, M.D., Leonard Bortin, M.D., Alvin Soffe, M.D., and Henry A. Shenkin, M.D.

The cerebral blood flow, metabolism, and vascular resistance were studied in a group of 15 patients with congestive heart failure using the nitrous oxide technique. No significant differences were found when the respective values were compared with values obtained for a control group. The cerebral oxygen utilization and blood flow in congestive heart failure were, however, found to be significantly reduced below values established for normal young individuals, but these changes were demonstrated to be a function of increasing age and arteriosclerosis and not of congestive failure. Both internal jugular venous pressure and cerebrospinal fluid pressure were found to be elevated in cardiac decompensation. These elevations were of similar magnitude but were not sufficiently great to adversely influence the cerebral circulation. Measurement of blood pCO_2 failed to reveal instances of a reduced cerebral blood flow which could be attributed to a reduced pCO_2. It is concluded that in congestive failure there is a tendency for the cerebral circulation and metabolism to be maintained in the face of a diminished cardiac output, although the probability of embarrassment of the cerebral circulation in extreme degrees of cardiac decompensation was not excluded and is considered to be quite likely.

Memoir of Walter Estell Lee*

By HERBERT REID HAWTHORNE

DR. WALTER ESTELL LEE was born in Philadelphia, July 22, 1879, the son of William Estell and Nellie Florence (Dickerson). Following his graduation from the University of Pennsylvania Medical School in 1902, he served as resident pathologist at the Pennsylvania Hospital (1902–03); interne at the Germantown Hospital (1903–04); resident anesthetist and chief resident physician at the Pennsylvania Hospital (1904–08). He was then appointed as assistant surgeon to the Pennsylvania and Germantown Hospitals. He then became surgeon to these hospitals and also the Bryn Mawr, Children's, Graduate, and Burlington County Hospitals. He later was chief of service at the Graduate, Pennsylvania, Bryn Mawr, and Germantown Hospitals for many years. In 1920, he was appointed associate professor of surgery at the Graduate School of Medicine, University of Pennsylvania, and in 1925, professor of surgery. In 1935, he was appointed vice dean of surgery in the Graduate School and continued with the teaching and directing of the course in surgery until his retirement on age in 1946. He was then elected emeritus professor of surgery.

Dr. Lee was intensely interested in the teaching of graduate students and the improvement of the hospital training program for residents. He took an active part in the early period of the foundation of the American Board of Surgery.

Dr. Lee was co-editor of Stewart and Lee's "Manual of surgery" through six editions. He also contributed a great many papers to the literature on varied subjects in general surgery. He was chairman of the editorial board of the *Annals of Surgery* from 1935 to 1947. He was recorder of the American Surgical Association from 1930 to 1946. He was a member of the State Board of Medical Education and Licensure from 1929 to 1937.

Dr. Lee was one of the first American surgeons to serve in World War I, joining the unit of Dr. J. W. White in June of 1915. He later served from 1917 to 1919 with the American army and was discharged with the rank of Lieutenant Colonel.

Dr. Lee was a member of the American Surgical Association, Philadelphia Academy of Surgery, College of Physicians of Philadelphia, International Surgical Society, American College of Surgeons, the American Association of Thoracic Surgeons, Society of Clinical Surgery, Philadelphia Pathological Society, Philadelphia Pediatric Society, Laennec Society, American Medical Association, and the Pennsylvania State and Philadelphia County Medical Society.

For many years, he was an elder of the Second Presbyterian Church. In spite of an extremely active life and long hours made necessary by his clinical practice, editorial work and teaching, he always made every effort to be an active church member. His daily life and conduct was a noble example to the younger men that surrounded him. He was always enthusiastic and was ever willing to work at any hour without thought of compensation. Due to the positions that he held, he was widely known and had many staunch friends in the surgical field. In addition, there were a host of others who enjoyed his deep friendship.

He is survived by his wife, Mrs. Margaret Gordon Lee, and a daughter, Jean Gordon Lee.

* Written and published at the request of the Council of the College of Physicians of Philadelphia.

Memoir of Charles A. E. Codman (1868–1952)*

By F. F. BORZELL

CHARLES AUSTIN EAGER CODMAN died at Camden, Maine on August 31, 1952 of a coronary thrombosis at the age of eighty-three. Camden, Maine played an important part in his life. It was there that his father, John Eager Codman, was born and Dr. Codman maintained a summer home there for almost his entire life. He was passionately fond of New England and it was indeed appropriate that his end should come where he had enjoyed many days of recreation in pursuit of his major pastime of hunting and fishing. Charles or Charlie as his friends all called him was born in Philadelphia on December 13, 1868. His father had come to Philadelphia three years previously to pursue a career of mechanical engineering. His mother was Emily Elizabeth Mahan of Elkton, Maryland. The Mahans took an active part in American life as owners of stage routes and country newspapers.

Dr. Codman received his public school education in Philadelphia, graduating from what was then the Boys' High School now Central High. He took a degree in dentistry at the University of Pennsylvania and taught in the dental school for two years. He then entered Medical School at the University and graduated in 1896. He interned at the Allegheny General Hospital, then in Allegheny and now Pittsburgh. While there he met and married Miss Eva Virginia Walker. This union resulted in a family of three children, two boys and a girl. The daughter Florence survived him and it is to her that the writer owes a number of interesting details of Dr. Codman's life.

Dr. Codman very early in his professional life took a lively interest in organized medicine as well as many medical scientific societies. He was an officer in many and president of most of the societies of which he was a member. He was President of the Philadelphia County Medical Society in 1913. Two years later he was elected President-Elect of the State Society. An enlightening side of Dr. Codman's forward looking views of the potential importance of the place of organized medicine in American life is revealed in a quotation from his Presidential address at the time of his inauguration as President of the State Society. In this speech he deplored, "The woeful lack of influence (meaning the State Society) in the last session of the Legislature which terminated in the passage of the Workmen's Compensation Law without even so much as the slightest recognition of the physician". He continued, "We have been working as a sectarian medical body and not representing the viewpoint of the entire profession. To remedy this condition efforts will be made to hold joint meetings of our Committee on Public Policy and Legislation with those of the Homeopathic and Eclectic Medical Societies." Dr. Codman took a keen and critical interest in the financial affairs of the Society in the hope that a strong financial structure would lead to placing the Society in a position of influence in the State. I again quote from his inaugural address, he expressed the "hope that we may see our way clear to establish a financial system that will lead to the creation of an endowment fund which will ultimately place the Society where it rightfully belongs." Needless to say he lived to see that accomplished both in the State and nationally. He served one year as a delegate from Pennsylvania to the A. M. A. House of Delegates in 1940. Dr. Codman was president of the Aid Association for five years and maintained an active interest in it until his death.

* Written and published at the request of the Council of the College of Physicians of Philadelphia.

Dr. Codman was President of the Medical Club of Philadelphia, the West Philadelphia Medical Association, and other groups. In fact, he enjoyed being introduced as Past President of all of the Medical Societies except the Women's Auxiliary. One distinguished group of which he was the oldest living member at the time of his death was the Sydenham Medical Coterie. He retired from active membership in this group about ten years ago but remained an emeritus member until his death. Of him a member of the Coterie, Dr. Joseph Doane, said, "None was more beloved by all of us and on the records of this Coterie will be inscribed in shining letters the story of the life of a fine Christian Philadelphia medical gentleman."

In 1937 Dr. Codman was elected President of the Philadelphia Institute of Medical Research to succeed Dr. Judson Daland. Dr. Codman was one of the founder members of this Institute.

While he was a man of strong convictions especially where professional dignity and integrity was concerned he attempted to translate his beliefs into action. This is best exemplified at the beginning of the first World War. Dr. Codman learned that some physicians were consulting the Surgeon General about the advisability or necessity of drafting physicians. On his own initiative he went to Washington to protest and secured a six weeks trial period in which to seek volunteers. Organizing a team of three, he toured Pennsylvania and recruited 300 physicians. He then went to Maine and in two weeks he recruited over twenty doctors from that thinly populated state. The result was that in 1917 and 1918 no medical men were drafted. A sequel of this effort was that while on duty in France in Base Hospital 121, a wounded man asked to see him. Dr. Codman went and found a man severely wounded in both legs. The man greeted him with "This is all your fault. You got me into this." The man was one of the physicians he had recruited.

"Charlie" was an ardent fisherman and also a gunner, and like all true sportsmen he was much interested in wild life conservation. His devotion to fishing is best appreciated when after being asked if he ever had any regrets for having chosen medicine as a profession, he replied promptly, "never". His interrogator then asked, "supposing you had not had to earn a living, what then?" At this he laughed and said "Ah, then it would have been fishing and medicine".

Dr. Codman was a man of sterling integrity, serious mien tempered by a delightful sense of humor, a ready raconteur and with an unlimited repertory. He lived for medicine and his profession but with more interest in its ethical elevation than personal advantage. We mourn his loss but are enriched for having known him.

List of College Lectures, 1952

2 January 1952

Andrewes, C. H. Prospects for Prevention of Influenza. (James M. Anders Lecture XXVII; *Transactions & Studies*, June, 1952)

6 February 1952

Cook, Robert C. The Physician's Concern in the Problem of Over-population. (Nathan Lewis Hatfield Lecture XXXVI; *Transactions & Studies*, August, 1952)

5 March 1952

Teague, Russell E. The Newer Concept of Preventive Medicine and Public Health. (James M. Anders Lecture XXVIII)

1 April 1952

Simonart, André. New Advances in the Pathology of Burns. (Mary Scott Newbold Lecture LXVI; *Transactions & Studies*, August, 1952)

14 May 1952

McCay, Clive M. Practical Considerations in Aging. (The central paper in a program arranged by the Philadelphia County Medical Society for this joint meeting with the College; *Transactions & Studies*, August, 1952)

7 October 1952

Wiener, Norbert. The Concept of Homeostasis in Medicine. (Alvarenga Prize Lecture XII; *Transactions & Studies*, February, 1953)

5 November 1952

Parran, Thomas. The Doctor of the Future. (Mary Scott Newbold Lecture LXVII; *Transactions & Studies*, February, 1953)

3 December 1952

Batson, Oscar V. The Veins of Bones: Their Connection and Significance. (Thomas Dent Mütter Lecture LXV)

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December 31, 1952

ELECTED

1952. Abelson, Neva Martin, 32 Woodale Rd.
1948. Adelizzi, Richard A., 1723 S. Broad St.
1926. Adler, Francis Heed, 313 S. 17th St.
1949. Aegerter, Ernest E., 3400 N. Broad St.
1914. Aiken, Thomas G., Berwyn, Pa.
1936. Alexander, Fay Knight, Germantown Professional Bldg., Greene and Coulter Sts.
1947. Allbritten, Frank F., Jr., 1025 Walnut St.
1906. Allen, Francis Olcott, Jr., Secane, Pa.
1932. Allen, Frederick H., 1711 Fitzwater St.
1935. Alpers, Bernard J., 111 North 49th St.
1930. Appel, Kenneth E., 111 N. 49th St.
1905. Appelman, Leighton Francis, 308 S. 16th St.
1935. Armitage, George L., 400 E. 13th St., Chester, Pa.
1922. Arnett, John H., 2116 Pine St.
1942. Aronson, Joseph D., Henry Phipps Institute, 7th and Lombard Sts.
1952. Ash, Rachel, 1740 Bainbridge St.
1920. Astley, G. Mason, 812 N. 63rd St.
1952. Aston, Melville J., 2507 S. 21st St.
1944. Atkins, Joseph P., 1201 Knox Rd., Wynnewood, Pa.
1935. Atlee, John L., Jr., 37 E. Orange St., Lancaster, Pa.
1952. Atlee, William A., 37 E. Orange St., Lancaster, Pa.
1935. Bach, Theodore F., 1900 Rittenhouse Sq.
1942. Bachman, Carl, Univ. of Pa. Hospital.
1937. Bacon, Emily P., 1930 Chestnut St.
1952. Baier, Howard N., 3401 N. Broad St.
1952. Baker, Howard W., 3401 N. Broad St.
1946. Baker, Walter W., 255 S. 17th St.
1940. Barba, Philip S., 5919 Greene St.
1943. Barden, Robert P., 8835 Germantown Ave.
1911. Barnard, Everett P., 1820 Rittenhouse Sq.
1939. Barnshaw, Harold D., 406 Cooper St., Camden, N. J.
1939. Bartle, Harvey, Jr., 133 S. 36th St.
1931. Bates, William, 2029 Pine St.
1932. Batson, Oscar V., 3502 Hamilton St.
1921. Bauer, Edward L., 1609 Spruce St.
1933. Bauer, John T., 312 E. Second St., Moorestown, N. J.
1939. Baumann, Frieda, 1930 Chestnut St.
1908. Beardsley, E. J. G., 1919 Spruce St.
1930. Beardwood, Joseph T., Jr., 2031 Locust St.
1952. Bedrossian, E. Howard, 2027 Spruce St.
1949. Beecham, Clayton T., Greene & Coulter Sts.
1935. Beerman, Herman, 2422 Pine St.
1942. Behrend, Albert, 255 S. 17th St.
1945. Behrend, Bernard, 5910 Greene St.
1934. Behrend, Moses, 255 S. 17th St.
1949. Beizer, Lawrence H., 255 S. 17th St.

1930. Belk, William Parks, 433 Owen Rd., Wynnewood, Pa.
1936. Bell, Benjamin Tertius, Abington Medical Bldg., Keith & York Rds., Abington, Pa.
1947. Bellet, Samuel, 2021 Spruce St.
1952. Bennett, George A., 1025 Walnut St.
1943. Berk, J. Edward, 711 64th Ave.
1951. Bernstine, J. Bernard, 255 S. 17th St.
1941. Bernstein, Mitchell, 1321 Spruce St.
1937. Bertolet, J. Allen, 4024 Timber Lane.
1934. Biddle, Sydney Geoffrey, 255 S. 17th St.
1918. Billings, Arthur E., 2020 Spruce St.
1952. Bird, Gustavus C., Jr., 3401 N. Broad St.
1949. Bishop, Edward H., 255 S. 17th St.
1933. Bishop, Paul A., Pennsylvania Hospital.
1944. Blady, John V., 340 Fishers Rd., Bryn Mawr, Pa.
1952. Blake, Paul O., 273 N. Lansdowne Ave., Lansdowne, Pa.
1951. Blank, Harvey, c/o E. R. Squibb & Sons, 745 Fifth Ave., New York 22, N. Y.
1917. Block, Frank B., 305 Tabor Medical Bldg., York & Tabor Rds.
1949. Blumstein, George I., 2039 Delancey St.
1929. Bockus, Henry L., 250 S. 18th St.
1928. Boles, Russell S., Rittenhouse Plaza, 1901 Walnut St.
1923. Bond, Earl D., 111 N. 49th St.
1911. Bonney, Charles W., 255 S. 17th St.
1948. Bookhammer, Robert S., 2031 Locust St.
1931. Bortz, Edward Le Roy, 2021 W. Girard Ave.
1921. Borzell, Francis Frank, 4940 Penn St.
1936. Bostwick, Delazon Swift, 106 Linwood Ave., Ardmore, Pa.
1928. Bothe, Albert E., 255 S. 17th St.
1928. Bothe, Frederick A., 255 S. 17th St.
1951. Boucot, Katharine R., 229 W. Upsal St.
1947. Bourland, Henry S., 2219 Garret Rd., Drexel Hill, Pa.
1923. Bower, John O., 2008 Walnut St.
1942. Bowie, Morris A., Rosemont, Pa.
1907. Bradley, William Nathaniel, 1725 Pine St.
1942. Branen, William, Whitby & Cypress Ave., Yeadon, Pa.
1921. Bransfield, John W., 2101 Spruce St.
1948. Braun, William, 406 Cooper St., Camden, N. J.
1951. Brinton, S. Jervis, Fishers Road, Bryn Mawr, Pa.
1946. Briscoe, Clarence Conway, 255 S. 17th St.
1952. Brody, Morris W., 1930 Chestnut St.
1917. Bromer, Ralph S., 318 Milbank Road, Bryn Mawr, Pa.
1936. Brown, Charles L., 1030 Indian Creek Rd.
1936. Brown, Clark E., Lankenau Hospital.
1932. Brown, Claude P., 1930 Chestnut St.
1919. Brown, Henry P., Jr., Willow Grove & Cherokee Avenues.
1939. Brust, Raymond W., 4710 Chester Ave.
1952. Bumgardner, Heath D., 3701 N. Broad St.
1940. Burnett, W. Emory, 3401 N. Broad St.
1952. Burros, Harry M., 5450 Wissahickon Ave.
1941. Butler, Miriam, 1930 Chestnut St.
1906. Butler, Ralph, 47th & Pine Sts.
1907. Cadwalader, Williams B., 133 S. 36th St.
1928. Campbell, Edward H., 133 S. 36th St.

1952. Campbell, Edward W., 1318 Medical Arts Bldg.
1944. Campion, Richard J., Penllyn Rd., Springhouse, Ambler, Pa.
1931. Cantarow, Abraham, 1025 Walnut St.
1952. Cardone, John B., 342 N. 63rd St.
1935. Carey, Lawrence S., 330 S. 9th St.
1931. Cariss, Walter L., 2043 Walnut St.
1930. Carpenter, Chapin, 1930 Chestnut St.
1905. Carpenter, Herbert B., 1805 Spruce St.
1926. Carpenter, Howard Childs, 1805 Spruce St.
1917. Carson, John B., 1802 Pine St.
1937. Castallo, Mario A., 1621 Spruce St.
1943. Castigliano, S. Gordon, 853 Mt. Pleasant Rd., Bryn Mawr, Pa.
1949. Caswell, H. Taylor, 3401 N. Broad St.
1950. Chamberlain, Richard H., 3400 Spruce St.
1933. Chamberlain, W. Edward, Temple University Hospital.
1939. Chamberlin, George W., Reading Hospital, Reading, Pa.
1900. Chance, Burton, 317 S. 15th St.
1945. Chance, Burton, Jr., 1726 Spruce St.
1948. Chapman, John P., Lincoln-Liberty Building, Broad & Chestnut Sts.
1950. Chapple, Charles C., Flourtown, Pa.
1939. Charr, Robert Kyun Hyun, 2038 Locust St.
1947. Chouké, Kehar S., P.O. Box 547, Kecoughton, Va.
1945. Cianfrani, Theodore, 1930 Chestnut St.
1939. Ciccone, Emmet F., 2021 Murray St.
1951. Clagett, Augustus H., Jr., U. S. Veterans Administration Hosp., Wilmington, Del.
1929. Clark, Eliot R., 315 S. 41st St.
1934. Clark, Jefferson Hamer, 101 Maple Ave., Wyncote, Pa.
1951. Clark, John K., University Hospital, 36th & Spruce Sts.
1947. Clark, Thomas Williams, 400 E. Willow Grove Ave.
1947. Classen, Charles H., Cushman Rd. and Lancaster Ave., Rosemont, Pa.
1926. Clerf, Louis H., 1530 Locust St.
1910. Cloud, J. Howard, 111 St. Pauls Road, Ardmore, Pa.
1903. Coates, George Morrison, 1721 Pine St.
1941. Cohen, J. Gershon, 255 S. 17th St.
1951. Cohen, Leon Solis-, 1422 Chestnut St.
1949. Cohen, Louis B., 1320 Arrott St.
1907. Cohen, Myer Solis-, 2110 Spruce St.
1934. Colgan, Robert C., 5882 N. Marshall St.
1934. Collins, Leon Howard, Jr., 133 S. 36th St.
1943. Colonna, Paul C., Univ. of Pa. Hospital.
1949. Conger, Kyril B., 3401 N. Broad St.
1945. Coonel, Pauline, 47 E. Mt. Pleasant Ave.
1930. Cooper, David A., 1520 Spruce St.
1947. Coppolino, John F., 1807 S. Broad St.
1952. Corbit, John D., Jr., 3818 Chestnut St.
1941. Cornelius, Chalmers E., 119 Summit Ave., Jenkintown, Pa.
1911. Cornell, Walter S., Board of Public Education, Parkway and 21st St.
1945. Corrigan, Patrick H., 1720 S. Broad St., Trenton, N. J.
1914. Corson, Edward F., 136 S. 16th St.
1946. Costello, Thomas J., 131 Pennsylvania Avenue, Bryn Mawr, Pa.
1924. Cowan, Alfred, 1930 Chestnut St.
1940. Cowan, Thomas H., 1930 Chestnut St.

1904. Craig, Frank A., The Henry Phipps Institute, 7th and Lombard Sts.
1907. Crampton, George S., 2031 Locust St.
1947. Crane, A. Reynolds, 807 Spruce St.
1937. Crane, Martin P., 2412 N. Broad St.
1920. Creighton, William J., 37 S. 20th St.
1952. Crellin, J. Antrim, 1930 Chestnut St.
1941. Creskoff, Adolph J., 3400 Spruce St.
1920. Cross, George H., Chester, Pa.
1917. Cross, Sumner H., P.O. Box 126, Jenkintown, Pa.
1921. Crossan, Edward T., 5324 Wayne Ave.
1904. Cruice, John M., 407 S. 22nd St.
1937. Crump, Jean, 1930 Chestnut St.
1937. Curtis, Lawrence, 255 S. 17th St.
1934. Custer, R. Philip, 221 Walnut Ave., Wayne, Pa.
1938. Dannenberg, Arthur M., 235 S. 15th St.
1951. Daugherty, Earl A., 2025 W. Girard Ave.
1947. Davis, C. Nelson, 133 South 36th St.
1936. Davis, David M., 255 S. 17th St.
1937. Davis, Perk Lee, 255 S. 17th St.
1951. Davis, J. Wallace, 135 S. 18th St.
1935. Deaver, J. Montgomery, 1830 Delancey Pl.
1947. Dehne, Theodore L., Adams Avenue and Roosevelt Blvd.
1902. Dehoney, Howard, 240 S. 13th St.
1935. Deibert, Irvin Elmer, 538 Cooper St., Camden, N. J.
1948. Deichler, John W., 1930 Chestnut St.
1923. De Long, Perce, 37 S. 20th St.
1952. DeLuca, Charles Q., 255 S. 17th St.
1952. De Orsay, Ralph H., 1241 Lindale Ave., Drexel Hill, Pa.
1951. De Palma, Anthony F., 248 S. 21st St.
1928. Dewees, A. Lovett, Glen Mills, Del. Co., Pa.
1952. Digilio, Victor A., 2200 St. James Place.
1924. Dillon, Edward S., 2028 Delancey Pl.
1932. Dintenfass, Henry, 1305 Spruce St.
1920. Doane, Joseph C., 617 W. Hortter St.
1948. Dohan, Francis Curtis, 80 Princeton Road, Cynwyd, Pa.
1946. Donnelly, Andrew J., 33rd and Powelton Ave.
1942. Donnelly, Edward J., 1321 Spruce St.
1933. Donnelly, Joseph C., 255 S. 17th St.
1937. Donnelly, Robert T. M., 255 S. 17th St.
1952. Drayer, Calvin S., 111 N. 49th St.
1910. Drayton, William, Jr., 1930 Spruce St.
1949. Dripps, Robert D., 3400 Spruce St.
1935. Duane, William, Jr., Rittenhouse Club, 18th & Walnut Sts.
1944. Dublin, George J., 1930 Chestnut St.
1944. Dugger, John H., 3902 Vaux St.
1935. Duncan, Garfield G., 330 S. 9th St.
1937. Dunn, Charles W., 265 S. 19th St.
1951. Dunne, Francis S., 133 S. 36th St.
1942. Durant, Thomas M., 3401 N. Broad St.
1947. Durkin, John Keenan, 34 W. Montgomery Ave., Ardmore, Pa.
1942. Dyer, W. Wallace, Univ. of Pa. Hospital.
1935. Eads, John T., 2029 Delancey St.

1911. Earnshaw, Henry C., Bryn Mawr, Pa.
1936. Easby, Mary Hoskins, Woman's Hospital.
1948. Eaton, Francis H., 4007 Chestnut St.
1937. Edeiken, Joseph, 2130 Delancey Pl.
1944. Eger, Sherman A., 2029 Delancey St.
1949. Egoville, John W., 720 N. 63rd St.
1944. Ehrich, William E., 540 W. Hortter St.
1930. Eiman, John, Cynwyd, Pa.
1946. Elfman, Louis Kenneth, 6330 Lebanon Avenue.
1949. Elkinton, J. Russell, Oak Lane, Moylan, Pa.
1939. Ellis, Van Mashburn, 1530 Locust St.
1928. Ellison, Richard T., 269 S. 19th St.
1936. Ellson, J. Vernon, 807 Spruce St.
1904. Elmer, Walter G., 1801 Pine St.
1937. Elsom, Kendall A., 133 S. 36th St.
1934. Ely, William C., 3912 Chestnut St.
1932. Engel, Gilson C., 255 S. 17th St.
1945. English, O. Spurgeon, 3401 N. Broad St.
1942. Erb, William H., 133 S. 36th St.
1950. Ersner, Matthew S., 1915 Spruce St.
1948. Everts, Glenn S., 5515 Wissahickon Ave., Apt. D-403.
1946. Farell, David M., 1912 Spruce St.
1903. Farr, Clifford B., Bryn Mawr, Pa.
1945. Farrar, George Elbert, Jr., 528 Scott Rd., Gladwyne, Pa.
1930. Farrell, John T., Jr., 255 S. 17th St.
1935. Ferguson, Lewis Kraeer, 133 S. 36th St.
1936. Fetter, Ferdinand, 322 S. 21st St.
1945. Fetter, John S., 842 Worrell Rd., Jenkintown, Pa.
1935. Fetter, Theodore R., 255 S. 17th St.
1924. Fewell, Alexander G., 1924 Pine St.
1952. Fields, Harry, 133 S. 36th St.
1943. Finkelstein, Arthur, 480 Latch's Lane, Merion, Pa.
1947. First, Arthur, 1714 Spruce St.
1945. Fiske, Frederick A., 1530 Locust St.
1952. Fitts, William T., Jr., 3400 Spruce St.
1928. Fitz-Hugh, Thomas, Jr., 2016 Delancey Pl.
1952. Flexner, Louis B., Univ. of Pa.
1928. Flick, John B., 330 S. 9th St.
1952. Flinn, Lewis B., 503 Delaware Ave., Wilmington, Del.
1939. Flippin, Harrison F., 255 S. 17th St.
1951. Ford, Elbert, S. C., 255 S. 17th St.
1941. Fox, C. Calvin, 1806 Spruce St.
1906. Fraley, Frederick, 71st and City Line.
1941. Frazier, William Doane, 419 Gilpin Rd., Narberth, Pa.
1952. Freed, Herbert, 255 S. 17th St.
1951. Friedland, Carl K., 133 S. 36th St.
1951. Friedman, Paul Sigmund, 1422 Chestnut St.
1942. Friedman, Reuben, 877 N. 6th St.
1933. Fritch, James Scott, 269 S. 19th St.
1937. Fritz, Herbert H., Pennswood Rd., Bryn Mawr, Pa.
1940. Fry, Kenneth E., 255 S. 17th St.
1935. Fry, Wilfred Eyles, 1930 Chestnut St.

1937. Furlong, Thomas F., Jr., Times Medical Building, Ardmore, Pa.
1935. Gammon, Geo. D., Univ. of Pa. Hospital.
1952. Gamon, Robert S., 514 Cooper St., Camden, N. J.
1951. Garlichs, Richard W., 216 N. Manoa Road, Havertown, Pa.
1931. Garner, Vaughn C., Germantown Professional Building.
1950. Garvin, Eugene J., 4219 Baltimore Ave.
1952. Gefter, William I., 1737 Chestnut St.
1935. Geist, Donald C., 1930 Chestnut St.
1899. Gibbon, John H., Media, Pa.
1934. Gibbon, John H., Jr., 1025 Walnut St.
1939. Gibson, Glen Gregory, 2031 Locust St.
1944. Gifford, Edward S., Jr., 1913 Spruce St.
1920. Gill, A. Bruce, 1930 Chestnut St.
1927. Gilmour, William R., 413–14 Weightman Bldg., 1524 Chestnut St.
1952. Gilpin, Sherman F., 255 S. 17th St.
1949. Ginsburg, Isadore W., 3401 N. Broad St.
1931. Giordano, Anthony A. S., 1819 S. Broad St.
1945. Goldberg, Samuel J., 1723 Pine St.
1933. Goldburgh, Harold L., 1932 Spruce St.
1935. Goldsmith, N. Ralph, 1351 Tabor Rd.
1949. Gopadze, Illarion I., 1809 Delancey Pl.
1928. Gordon, Burgess L., Woman's Medical College of Pa.
1937. Gordon, William, 5345 Spruce St.
1941. Gouterman, Joseph I., 1930 Chestnut St.
1894. Graham, Edwin E., 1713 Spruce St.
1926. Grant, Francis Clark, Univ. of Pa. Hospital.
1940. Greene, Lloyd B., 136 S. 16th St.
1952. Greening, Roy R., 3400 Spruce St.
1950. Gregory, John E., 235 N. 15th St.
1934. Griffith, John Q., Jr., 6 N. Fredericksburg Ave., Margate, N. J.
1945. Griffiths, John E., Mermont Apartments, Bryn Mawr, Pa.
1941. Groff, Robert A., 1930 Chestnut St.
1952. Gross, Elmer R., 1402 Spruce St.
1952. Grotzinger, Paul J., 7163 Georgian Rd.
1952. Grove, D. Dwight, 230 N. Broad St.
1933. Gruber, Charles M., 128 Overhill Rd., Cynwyd, Pa.
1932. Guequierre, Jacques P., Mermont Plaza, Bryn Mawr, Pa.
1945. György, Paul, Univ. of Pa.
1935. Hadden, Samuel B., 37 S. 20th St.
1951. Hafkenschiel, Joseph H., 3600 Spruce St.
1945. Hahn, George A., 255 S. 17th St.
1935. Haines, Harlan F., 134 S. State Rd., Upper Darby, Pa.
1951. Hallett, Joseph W., 1001 Medical Arts Bldg., 16th & Walnut Sts.
1939. Hamblock, Leonard C., 1632 Spruce St.
1938. Hand, John G., 1724 Pine St.
1947. Hanes, William James, 218 E. Beechtree Lane, Wayne, Pa.
1952. Harer, W. Benson, 255 S. 17th St.
1951. Harkins, Herbert P., 1930 Chestnut St.
1932. Harris, Stanley E., 229 Maple Ave., Delanco, N. J.
1948. Harris, T. N., 2222 N. 53rd St.
1929. Harrison, Francis G., 1900 Spruce St.
1933. Harrison, William John, 135 S. 17th St.

1926. Hartmann, Fred L., 1914 Pine St.
1946. Harvey, Edith E., 406 York Rd., Jenkintown, Pa.
1947. Harvey, Rolfe Marsh, Glenmary & Houston Rds., Radnor, Pa.
1935. Haskell, Benjamin F., 1426 Spruce St.
1946. Hatfield, C. Alexander, 330 S. 9th St.
1947. Havens, Walter Paul, Jr., 300 Cherry Lane, Wynnewood, Pa.
1947. Hawthorne, Herbert Reid, 250 S. 18th St.
1952. Hayllar, Benjamin L., 801 Medical Arts Bldg.
1911. Heed, Charles R., College Ave. & Coopertown Rd., Haverford, Pa.
1946. Hendrickson, Frank O., 37 S. 20th St.
1944. Herbut, Peter A., Jefferson Medical College Hospital.
1951. Herrman, Clinton S., 255 S. 17th St.
1944. Hershey, J. Ivan, 935 Bowman Ave., Wynnewood, Pa.
1924. Hewson, William, 1614 Locust St.
1949. Heyl, W. Meredith, 100 W. Coulter St.
1952. Hinkson, DeHaven, 329 N. 40th St.
1924. Hirst, John C., 2d, 500 N. 20th St.
1943. Hitschler, William J., 8840 Germantown Ave.
1944. Hneleski, Ignatius S., 802 S. 48th St.
1943. Hockaday, Agnes, 316 Shadeland Ave., Drexel Hill, Pa.
1939. Hodes, Philip J., Univ. of Pa. Hospital.
1947. Hodges, John H., 1025 Walnut St.
1948. Hoffman, George L., Jr., 133 S. 36th St.
1949. Hollander, Joseph L., 36th & Spruce Sts.
1932. Hollingsworth, I. Pemberton, 411 N. Walnut St., West Chester, Pa.
1951. Hollis, Charles B., 1930 Chestnut St.
1952. Holloway, Edward E., 1739 W. Montgomery Ave.
1949. Hopkins, Henry U., 4526 Osage Ave.
1946. Horan, Gerald W., 5819 Chester Ave.
1950. Horn, Robert C., 57 Berkley Ave., Lansdowne, Pa.
1947. Horwitz, Orville, 133 S. 36th St.
1950. Houlihan, Carl T., 728 S. 60th St.
1944. Housel, Edmund L., 255 S. 17th St.
1928. Houser, Karl Musser, 2035 Delancey Pl.
1938. Howell, John Carnett, 326 S. 19th St.
1948. Howland, Alvin Wilcox, 255 S. 17th St.
1946. Howson, John Yeatts, 316 Lancaster Ave., Wayne, Pa.
1951. Hubbard, John P., University of Penna., School of Medicine.
1947. Huber, John Franklin, Temple University Hospital.
1937. Hughes, Joseph, 111 N. 49th St.
1939. Hughes, P. Boland, 419 Hillbrook Rd., Bryn Mawr, Pa.
1923. Hume, John E., 900 S. 49th St.
1951. Hundley, J. Warren, 3818 Chestnut St.
1946. Hunt, William T., Jr., 1930 Chestnut St.
1921. Hunter, Robert John, Univ. of Pa. Hospital.
1926. Husik, David N., 331 S. 46th St.
1952. Hyman, Harold L., 3401 N. Broad St.
1950. Imbriglia, Joseph E., 329 Shadeland Ave., Drexel Hill, Pa.
1952. Imperiale, C. Charles, 1331 Pine St.
1935. Ingleby, Helen, Jewish Hospital, York & Tabor Rds.
1949. Ingraham, Norman R., Jr., Stenton and Whitemarsh Ave.
1951. Isard, Harold J., Mt. Sinai Hospital, 5th & Reid Sts.

1951. Israel, Harold L., 255 So. 17th St.
1947. Israel, S. Leon, 2116 Spruce St.
1952. Iverson, Preston C., 1930 Chestnut St.
1921. Ivy, Robert H., 1930 Chestnut St.
1917. Jackson, Chevalier, 3401 N. Broad St.
1932. Jackson, Chevalier L., Rittenhouse Plaza, 19th & Walnut Sts.
1934. Jacobs, Maurice, 1831 Delancey Place.
1947. Jaeger, Rudolph, Jefferson Hospital.
1952. Janton, O. Henry, 230 N. Broad St.
1941. Jeffers, William A., University of Pa. Hospital.
1928. John, Rutherford L., 256 S. 21st St.
1942. Johnson, Julian, 406 Conshohocken State Rd., Narberth, Pa.
1938. Johnson, Thomas A., 250 S. 18th St.
1952. Jonas, Karl C., 3401 N. Broad St.
1918. Jonas, Leon, 255 S. 17th St.
1924. Jones, Harold W., 1930 Chestnut St.
1952. Jones, Ralph, Jr., 3400 Spruce St.
1936. Kain, Thomas M., 403 Cooper St., Camden, N. J.
1948. Kaplan, Louis, 2040 Pine St.
1938. Kasper, Kelvin A., 135 S. 18th St.
1945. Katz, G. Henry, 111 N. 49th St.
1941. Kauffman, M. Luther, Medical Arts Bldg., Jenkintown, Pa.
1947. Kay, Calvin Frederick, Univ. of Pa. Hospital.
1947. Keefer, George Pfahler, 3708 Woodland Ave., Drexel Hill, Pa.
1938. Keeler, Harold R., 136 S. 16th St.
1949. Keiserman, Joseph, 5460 Baltimore Ave.
1935. Kelley, George F. J., N. E. Cor. 20th and Chestnut Sts.
1932. Kelly, Herbert T., 1900 Spruce St.
1912. Kelly, Thomas C., 105 School Lane.
1941. Kennedy, Patrick J., 6910 Market St., Upper Darby, Pa.
1947. Kennedy, William Blair, 3400 Spruce St.
1948. Kern, Franklin Moore, 408 E. Wynnewood Rd., Wynnewood, Pa.
1921. Kern, Richard A., Temple University Hospital.
1935. Keyes, Baldwin L., 2031 Locust St.
1930. Kimbrough, Robert A., Jr., 807 Spruce St.
1936. King, Orville C., 330 S. 9th St.
1952. Kirshner, Jacob J., 1930 Chestnut St.
1920. Klauder, Joseph V., 1934 Spruce St.
1920. Klein, Thomas, 250 S. 18th St.
1952. Kleinbart, Morris, 1922 Pine St.
1934. Kline, Oram R., 514 Cooper St., Camden, N. J.
1948. Klingensmith, Paul O., 133 S. 36th St.
1932. Klopp, John W., 731 E. Phil-Ellena St.
1919. Knipe, Norman L., 1930 Chestnut St.
1908. Knowles, Frank C., 423 Warick Rd., Wynnewood, Pa.
1945. Kobler, H. B., 658 N. 63rd St.
1914. Kolmer, John A., Cynwyd, Pa.
1936. Konzelmann, Frank Williamson, 12 E. Lenox St., Chevy Chase, Md.
1949. Koop, C. Everett, 1740 Bainbridge St.
1952. Kornblueh, Igho H., 1241 W. Lehigh Ave.
1941. Krall, J. Thomas, 1927 Spruce St.
1948. Kramer, David W., 2007 Pine St.

1944. Krauss, Frederick Harold, 2014 Delancey Place.
1952. Kravitz, Charles H., 1726 Widener Pl.
1949. Kremer, David N., 1918 Pine St.
1949. Kressler, Robert J., 330 S. 9th St.
1941. Krewson, William E., 3rd., 1930 Chestnut St.
1914. Krumbhaar, Edward B., School of Medicine, Univ. of Pa.
1947. Kuhlenbeck, Hartwig, Woman's Medical College.
1947. La Boccetta, Alfred Charles, 2nd and Luzerne Sts.
1952. Lachman, John W., 3401 N. Broad St.
1949. La Clair, Charles H., Jr., 1021 W. Main St., Norristown, Pa.
1952. Lafferty, Henry D., 37 S. 20th St.
1951. Lame, Edwin L., 51 N. 39th St.
1950. Lamont, Austin, 3400 Spruce St.
1946. Lampe, William T., 4207 Tyson Ave.
1952. Lang, Warren R., 255 S. 17th St.
1933. Langdon, Roy L., 5917 Greene St.
1941. Langner, Paul H., Jr., 130 S. 18th St.
1945. Lansbury, John, 3401 N. Broad St.
1934. Laplace, Louis B., 1930 Chestnut St.
1926. Laws, George M., 1907 Spruce St.
1936. Leaman, William G., Jr., 3700 Baring St.
1950. Learner, Norman, 255 S. 17th St.
1920. Leavitt, Frederic Headley, 1527 Pine St.
1941. Leberman, Paul R., 136 S. 16th St.
1942. Lehman, James A., 255 S. 17th St.
1952. Lehman, J. Stauffer, 230 N. Broad St.
1951. Leivy, Frank E., 1321 Spruce St.
1944. Lell, William A., 203 W. Chestnut Ave.
1935. Lemmon, William T., 133 S. 36th St.
1943. Leopold, Irving H., 1930 Chestnut St.
1920. Leopold, Simon S., 255 S. 17th St.
1944. Lettiere, Anthony J., 425 E. State St., Trenton, N. J.
1933. Levering, J. Walter, Abington Memorial Hospital, Abington, Pa.
1915. Lewis, Fielding O., Providence Road, Media, Pa.
1938. Lewis, James P., 3815 Chestnut St.
1949. Lhamon, William T., Univ. of Pa. Hospital.
1948. Lieber, Marshall M., 1025 Walnut St.
1948. Lieberman, Louis M., 923 Belmont Ave.
1940. Limberger, William A., 301 S. Church St., West Chester, Pa.
1938. Lindauer, M. August, 133 S. 36th St.
1927. Lindsey, Walter H., 810 W. Dauphin St.
1936. Lintgen, Charles, 1930 Chestnut St.
1945. Lisker, Samuel, 1930 Chestnut St.
1944. Livezey, Mary M., 7200 Cresheim Rd.
1936. Llewellyn, Thomas H., 910 N. 63rd St.
1907. Lodholz, Edward, 431 S. 45th St.
1931. Loewenberg, Samuel A., 1905 Spruce St.
1933. Long, Esmond R., Henry Phipps Institute, 7th and Lombard Sts.
1949. Long, Joan Humphrey, 198 Lafayette Ave., Haddonfield, N. J.
1951. Long, Joseph P., 1930 Chestnut St.
1935. Long, William L., 2025 Walnut St.
1931. Longaker, Edwin P., 41 E. Montgomery Ave., Ardmore, Pa.

1951. Lorber, Stanley H., 3400 N. Broad St.
1942. Lownes, John B., 924 Medical Arts Bldg.
1936. Lucchesi, Pascal Francis, 601 E. Gorgas Lane.
1921. Lucké, Balduin H. E., School of Medicine, Univ. of Pa.
1932. Lukens, Francis D. W., Univ. of Pa. Hospital.
1930. Lukens, Robert M., 1308 W. Hunting Park Ave.
1939. Luongo, Romeo A., 2054 Locust St.
1947. Lurie, Max B., Henry Phipps Institute, 7th and Lombard Sts.
1951. Luscombe, Herbert A., 136 S. 16th St.
1952. Lutman, Frank C., 100 W. Coulter St.
1919. Lynch, Frank B., Jr., Germantown Hosp., Penn and Chew Sts.
1950. Lynch, J. Edward, 255 S. 17th St.
1914. Lyon, B. B. Vincent, Box 955, Winter Park, Fla.
1933. McAndrews, Leo F., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1952. McCabe, Edward S., 6725 Ridge Ave.
1932. McCahey, James F., 1534 Pine St.
1948. McCall, Milton L., 1930 Chestnut St.
1900. McCarthy, Daniel J., 2025 Walnut St.
1936. McCarthy, Patrick A., Central Medical Bldg.
1935. McClenahan, William U., 1 Summit Ave.
1931. McCloskey, Edward, 7 E. Chesnut Ave.
1942. McCloskey, John F., 8720 Germantown Ave.
1935. McConnell, James W., 20th and Chestnut Sts.
1934. McCouch, Grayson P., Medical School, Univ. of Pa.
1938. McCrea, Lowrain E., 1930 Chestnut St.
1937. McCutcheon, Morton, Cambridge Apts.
1942. McDonald, P. Robb, 1930 Chestnut St.
1952. McElroy, Robert C., 133 S. 36th St.
1950. McFadden, William M., 1187 E. Washington Lane.
1949. McGavic, John S., 601 Montgomery Ave., Bryn Mawr, Pa.
1945. McGee, Lemuel Clyde, Hercules Powder Company, Wilmington, Del.
1952. McGlade, Thomas H., 719 Cooper St., Camden, N. J.
1937. McGuinness, Aims C., Children's Hospital, 1740 Bainbridge St.
1940. McLaughlin, Edward F., 4116 N. Broad St.
1933. McLaughlin, James S., 330 S. 9th St.
1924. McMillan, Thomas M., 2044 Locust St.
1924. McPhedran, F. Maurice, Germantown Hosp., Penn and Chew Sts.
1943. Macfarlan, Douglas, 1805 Chestnut St.
1932. Macfarlane, Catharine, 136 S. 16th St.
1947. Machella, Thomas E., Univ. of Pa. Hospital.
1950. Mackmull, Gulden, Germantown Professional Building.
1949. MacNeal, Perry Scott, 330 S. 9th St.
1939. Macneill, Norman N., 5807 Chew St.
1951. Mac Neish, W. J., Medical Arts Bldg., 16th & Walnut Sts.
1935. Maeder, LeRoy M. A., 1910 Rittenhouse Sq.
1952. Mahoney, J. Francis, 250 S. 18th St.
1942. Manges, Lewis C., Jr., 319 S. 16th St.
1936. Mann, Bernard, 2019 Pine St.
1948. Marden, Philip Ayer, 1912 Spruce St.
1937. Margolies, Alexander, 1351 Tabor Rd.
1950. Mark, George E., 3401 N. Broad St.
1950. Marshall, E. Wayne, Jr., 1520 Spruce St.

1941. Martin, James R., 136 S. 16th St.
1951. Martin, William L., Hahnemann Hospital.
1952. Martucci, Albert A., 1460 E. Cheltenham Ave.
1939. May, Hans, 255 S. 17th St.
1934. Mecray, Paul M., 405 Cooper St., Camden, N. J.
1952. Mecray, Paul M., Jr., 405 Cooper St., Camden, N. J.
1951. Medinger, Frederick G., 255 S. 17th St.
1941. Mendell, Theodore H., 2023 Spruce St.
1951. Mendelssohn, Edwin, 255 S. 17th St.
1949. Menkin, Valy, 3401 N. Broad St.
1943. Meranze, David R., 1031 Lakeside Ave.
1937. Meyer, George Phillip, 410 Haddon Ave., Camden, N. J.
1935. Miller, Ford A., 4016 Chestnut St.
1946. Miller, Franklin R., Jefferson Medical College.
1939. Miller, Malcolm W., 255 S. 17th St.
1939. Miller, Merle M., 6013 Greene St.
1932. Miller, M. Valentine, 114 W. Phil-Ellena St.
1921. Miller, T. Grier, 133 S. 36th St.
1952. Minehart, John R., 4821 Germantown Ave.
1952. Mintz, S. S., 1429 S. 5th St.
1937. Missett, Joseph Vincent, Jr., 2031 Locust St.
1904. Mitchell, Charles Franklin, 2003 Pine St.
1950. Mitchell, John McK., Medical School, Univ. of Pa.
1952. Mitchell, Robert McNair, 330 S. 9th St.
1948. Mogavero, Francesco, 1930 Chestnut St.
1932. Mohler, Roy W., 1806 Spruce St.
1936. Montgomery, Hugh, 119 Glenn Road, Ardmore, Pa.
1936. Montgomery, John B., 1930 Chestnut St.
1932. Montgomery, Thaddeus L., 2031 Locust St.
1951. Moore, Edward J., 204 Meeting House Lane, Merion, Pa.
1935. Moore, John Royal, Beury Bldg., Broad St. and Erie Ave.
1947. Moore, Matthew Thibaud, 1813 Delancey Pl.
1924. Moorhead, Stirling W., 1523 Pine St.
1936. Morgan, David R., Jefferson Medical College.
1893. Morris, Elliston J., 439 Midland Ave., St. Davids, Del. Co., Pa.
1944. Morris, Harold H., Villa Nova, Pa.
1945. Morris, I. Paul, 255 S. 17th St.
1941. Mucklé, Craig Wright, 255 S. 17th St.
1929. Mudd, Stuart, Department of Bacteriology, Medical School, Univ. of Pa.
1949. Mulholland, Stanford W., 255 S. 17th St.
1935. Mullen, Carroll Richard, 2025 Locust St.
1934. Mullen, Edward A., 472 Roxborough Ave.
1930. Murphy, Douglas P., Univ. of Pa. Hospital.
1934. Murphy, Eugene C., 1841 S. Broad St.
1951. Myers, David, 304 S. 19th St.
1945. Naide, Meyer, 2034 Spruce St.
1951. Naidoff, David, 37 S. 20th St.
1950. Nardone, Anthony A., 912 S. 49th St.
1950. Neefe, John R., 2016 Delancey Pl.
1948. Neese, Paul H., 17 Derwen Road, Cynwyd, Pa.
1936. Nelson, Guy M., 255 S. 17th St.
1943. Nelson, Waldo E., 615 Moreno Rd., Narberth, Pa.

1905. Newcomet, William S., 3501 Baring St.
1938. Newton, Zachariah B., 601 E. Sedgwick St.
1935. Nicholson, Jesse Thompson, Pennsylvania Hospital.
1941. Nisbet, Verner, 254 S. 45th St.
1950. Nixon, Norman, 111 N. 49th St.
1947. Noone, Ernest L., 4501 Cedar Lane, Drexel Hill, Pa.
1905. Norris, Charles C., Darby and Goshen Roads, Bryn Mawr, Pa.
1938. Norris, Robert F., 513 Wynnewood Ave., Wynnewood, Pa.
1947. O'Keefe, John J., 255 South 17th St.
1913. O'Neal, Alexander Hay, St. Davids, Pa.
1949. O'Neill, James F., 140 Roslyn Ave., Glenside, Pa.
1947. Ornsteen, A. M., 2007 Delancey Pl.
1947. Ornston, Darius Gray, 36 Carpenter Lane.
1936. Orr, Theodore E., 1930 Chestnut St.
1913. Outerbridge, George W., 1927 Spruce St.
1915. Owen, Hubley R., 311 S. Juniper St.
1949. Padis, Nicholas, 255 S. 17th St.
1909. Parish, Benjamin Dores, 1927 Spruce St.
1945. Park, Felix Roman, Medical Arts Bldg., Tulsa, Okla.
1940. Parker, Alan P., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1948. Parkhurst, Leonard Woods, 330 S. 9th St.
1944. Paschkis, Karl E., Jefferson Medical College.
1952. Paxson, Newlin F., 250 S. 18th St.
1932. Payne, Franklin L., Univ. of Pa. Hospital.
1943. Pearson, Gerald H. J., 111 N. 49th St.
1952. Peck, Roy I., 3400 Spruce St.
1930. Pendergrass, Eugene P., Univ. of Pa. Hospital.
1914. Pepper, O. H. Perry, Univ. of Pa. Hospital.
1916. Percival, Milton Fraser, 2332 S. Broad St.
1942. Perkins, William Harvey, 1025 Walnut St.
1946. Perloff, William Harry, 1930 Chestnut St.
1951. Perri, Angelo M., 814 Federal St.
1940. Pessel, Johannes, F., 224 West State St., Trenton, N. J.
1952. Peters, Michael, 262 W. Broad St., Telford, Pa.
1940. Pettit, Horace, Times Medical Bldg., Ardmore, Pa.
1949. Pettit, Mary DeWitt, 1930 Spruce St.
1905. Pfahler, George E., 1930 Chestnut St.
1915. Pfeiffer, Damon B., Meadowbrook, Pa.
1946. Pfeiffer, Mildred C. J., 358 Valley Rd., Merion, Pa.
1935. Phillips, Arthur W., 3904 Walnut St.
1911. Piersol, George Morris, Univ. of Pa. Hospital.
1948. Pierson, Daniel B., Jr., 1830 Delancey St.
1933. Pillsbury, Donald M., Univ. of Pa. Hospital.
1950. Pincus, Irwin J., 269 S. 19th St.
1951. Poinsard, Paul J., 2031 Locust St.
1937. Polk, David Stewart, Rosemont, Pa.
1932. Porter, Roland De Lance, Jenkintown, Pa.
1951. Post, Joseph W., 1930 Chestnut St.
1951. Pote, Harry H., 4032 Walnut St., Phila. 4.
1949. Pratt, Gerald E., 3009 Frankford Ave.
1951. Pressman, Robert S., 269 S. 19th St.
1947. Prickett, John A., Warrington, Bucks County, Pa.

1931. Pryor, Charles Allen, 255 S. 17th St.
1952. Pugh, James E., 614 Church Lane, Yeadon, Pa.
1947. Putney, Floyd Johnson, 2029 Delancey St.
1943. Radbill, Samuel X., 7043 Elmwood Ave.
1945. Rakoff, Abraham Edward, 269 S. 19th St.
1931. Ramsey, Frank M., 620 E. Willow Grove Ave.
1941. Rankin, Charles A., Ludlow & Heather Rd., Upper Darby, Pa.
1946. Rapoport, Milton, Children's Hospital, 1740 Bainbridge St.
1951. Rathmell, Thomas K., 446 Bellevue Ave., Trenton, N. J.
1926. Ravdin, I. S., Univ. of Pa. Hospital.
1928. Reese, Warren S., 2118 Locust St.
1925. Reeves, Rufus S., Presidential Apts.
1920. Rehfuss, Martin E., 131 St. George's Rd., Ardmore, Pa.
1921. Reiff, E. Paul, 1927 Spruce St.
1919. Reimann, Stanley P., 703 W. Phil-Ellena St.
1951. Rentschler, Laurence B., 5800 Ridge Ave.
1945. Rhoads, Jonathan E., Univ. of Pa. Hospital.
1936. Richards, James L., Bryn Mawr Medical Bldg., Bryn Mawr., Pa.
1951. Richardson, Fred Mac D., 160 Carpenter Lane.
1919. Richardson, Russell, 605 Suburban Sq., Ardmore, Pa.
1951. Riegel, Donald, 5110 Chester Ave.
1942. Riggs, Helena E., Philadelphia General Hospital.
1936. Ritter, Joseph A., 2405 N. 54th St.
1932. Robbins, Frederick R., 317 Milbank Rd., Bryn Mawr, Pa.
1952. Robbins, Robert, 3401 N. Broad St.
1939. Roberts, Ella, 133 S. 36th St.
1899. Roberts, Walter, 1921 Spruce St.
1932. Robertson, Harold F., 2118 Pine St.
1903. Robertson, William Egbert, 2118 Pine St.
1938. Roche, Philip Q., 255 S. 17th St.
1912. Rodman, John Stewart, American Board of Surgery, 255 S. 15th St.
1947. Rogers, Arthur Merriam, 133 S. 36th St.
1934. Rogers, Harry L., 255 S. 17th St.
1951. Ronis, Bernard J., 2106 Spruce St.
1948. Roscoe, Constantine R., 7226 Castor Ave.
1928. Rose, Edward, 426 Owen Rd., Wynnewood, Pa.
1936. Rose, Elizabeth Kirk, 426 Owen Rd., Wynnewood, Pa.
1952. Rose, S. Brandt, Chesnut Hill Hospital.
1946. Rosemond, George Parrott, Temple University, Broad & Ontario Sts.
1948. Rothman, Maurice M., 1727 Spruce St.
1932. Rothrock, Harry A., West Chester, Pa.
1936. Rothschild, Norman, 245 S. 16th St.
1951. Rouse, George P., Jr., 2031 Locust St.
1952. Roxby, Bruce S., 5501 Greene St.
1937. Roxby, John B., P. O. Box #28, Swarthmore, Pa.
1949. Royster, Henry P., 3400 Spruce St.
1941. Royster, Hubert A., Jr., The Mermont, Bryn Mawr, Pa.
1952. Rubin, I. Edward, 1737 Chestnut St.
1933. Rudolphy, Jay Besson, 230 S. 21st St.
1946. Rupp, Charles, 133 S. 36th St.
1947. Rush, Alexander, 330 South 9th St.
1945. Rynes, Samuel E., 334 S. 21st St.

1952. Sain, Fletcher D., Abington Memorial Hospital, Abington, Pa.
1952. Salner, Nathan P., 259 S. 17th St.
1952. Saltzman, Maurice, 1923 Spruce St.
1944. Sampson, David Alan, 726 Braeburn Lane, Penn Valley, Narberth, Pa.
1936. Sands, Joseph Evans, Rosemont, Pa.
1950. Sarner, Joseph B., 1803 Pine St.
1949. Saul, Leon J., Highland Ave., Media, Pa.
1908. Sautter, Albert C., Germantown Professional Bldg.
1947. Saÿen, John J., 506 Montgomery Ave., Haverford, Pa.
1948. Scarano, Joseph Albert, 1432 S. Broad St.
1920. Scarlett, Hunter W., 825 Montgomery Ave., Bryn Mawr, Pa.
1917. Schaeffer, J. Parsons, Daniel Baugh Institute, 307 S. 11th St.
1929. Scheffey, Lewis C., 255 S. 17th St.
1942. Scheie, Harold G., 313 S. 17th St.
1929. Schenck, Harry P., 1235 Wyngate Rd., Wynnewood, Pa.
1945. Schlezinger, Nathan S., 255 S. 17th St.
1917. Schnabel, Truman G., 1704 Pine St.
1917. Schoff, Charles H., Media, Pa.
1952. Schulz, Norbert J., 1901 Walnut St.
1921. Schumann, Edward A., 1814 Spruce St.
1950. Schumann, Francis N., 8811 Germantown Ave.
1948. Schwarz, Gabriel A., 255 S. 17th St.
1930. Scott, John Porter, Children's Hospital, 1740 Bainbridge St.
1950. Scott, Michael, 255 S. 17th St.
1940. Scott, T. F. McNair, Children's Hospital, 1740 Bainbridge St.
1952. Seifer, Arthur F., 3401 N. Broad St.
1951. Seitchik, Joseph N., 1417 Race St., Hahnemann Medical College Annex.
1952. Semisch, Charles W., III, 5329 Rising Sun Ave.
1951. Shaffer, Bertram, 1825 Pine St.
1924. Shallow, Thomas A., 1611 Spruce St.
1950. Sharp, Reuben L., 719 Cooper St., Camden, N. J.
1928. Sharpless, Frederick C., Greensboro, Vt.
1948. Shay, Harry, 3400 N. Broad St.
1946. Shepherd, Samuel Garfield, 2039 Pine St.
1932. Sheridan, Joyce T., 412 W. Durham St.
1936. Shipman, James Shelby, 255 S. 17th St.
1935. Shoemaker, Robert, 3rd, 68 Byberry Rd., Hatboro, Pa.
1946. Shoup, George Daniel, 7007 N. 12th St.
1952. Shuman, Charles R., 3401 N. Broad St.
1936. Shuster, Benjamin H., 1824 Pine St.
1949. Sidlick, David M., 255 S. 17th St.
1941. Silcox, Louis E., 255 S. 17th St.
1907. Sinkler, Francis W., 514 N. Rose Lane, Bryn Mawr, Pa.
1952. Skromak, Stanley J., 5108 Torresdale Ave.
1929. Smith, Austin T., 1830 Spruce St.
1933. Smith, Lauren Howe, 111 N. 49th St.
1952. Smith, Richard T., 330 S. 9th St.
1927. Smyth, Calvin Mason, Abington Memorial Hospital, Abington, Pa.
1951. Snape, William J., 573 Stevens St., Camden, N. J.
1938. Snodgrass, L. E., 2011 Chestnut St.
1935. Sokoloff, Martin J., 255 S. 17th St.
1940. Soloff, Louis A., 255 S. 17th St.

1950. Somerville, William J., 2022 Locust St.
1935. Sommer, George N. J., 120 W. State St., Trenton, N. J.
1944. Sommer, George N. J., Jr., 120 W. State St., Trenton, N. J.
1952. Sones, Maurice, Mt. Airy Medical Bldg.
1951. Sonneborn, Duane G., 1200 W. Erie Ave.
1928. Spaeth, Edmund B., 1930 Chestnut St.
1937. Spangler, John Luther, Devon, Pa.
1935. Spiegel, Ernest, 6807 Lawnton Ave., Oak Lane.
1944. Stadie, William C., University Hospital.
1927. Starr, Isaac, 505 Cresheim Valley Rd.
1952. Stauffer, Herbert M., 3401 N. Broad St.
1952. Stayman, Joseph W., Jr., Germantown Hospital.
1945. Stecher, H. Armin, 1510 Darby Rd., Havertown, Pa.
1952. Steele, Eleanor A., 1640 Pine St.
1952. Steiger, William A., 3432 N. Broad St.
1946. Stein, Irvin, 1936 Spruce St.
1947. Steiner, Charles A., Upper Darby, National Bank Building, Upper Darby, Pa.
1936. Steinfield, Edward, N. E. Cor. 18th and Chestnut Sts.
1942. Stengel, Alfred, Jr., Lancaster Ave. and Cambria Court, St. Davids, Pa.
1951. Sterling, Julian A., 255 So. 17th St.
1948. Stevens, Lloyd W., 133 S. 36th St.
1941. Stewart, Winifred B., 1930 Spruce St.
1949. Stockwell, Eunice L., 2018 Pine St.
1925. Stokes, John H., 4228 Spruce St.
1928. Stokes, Joseph, Jr., Children's Hospital, 1740 Bainbridge St.
1943. Stokes, S. Emlen, 129 Chester Ave., Moorestown, N. J.
1952. Stoner, Emery K., 222 E. Mt. Pleasant Ave.
1923. Strecker, Edward A., 111 N. 49th St.
1923. Stroud, William Daniel, 1011 Clinton St.
1937. Strumia, Max M., Penn Valley, Narberth, Pa.
1937. Sturgis, Margaret C., 349 Wistar Rd., Wynnewood, Pa.
1927. Sturgis, Samuel Booth, 349 Wistar Rd., Wynnewood, Pa.
1934. Summey, Thomas J., 330 S. 9th St.
1930. Sunderman, F. William, 6627 Greene St.
1936. Surver, James Miller, 1020 Clinton St.
1928. Swartley, William B., 6002 Greene St.
1952. Sweeney, Francis X., 1420 St. Antoine St., Detroit, Mich.
1944. Swenson, Paul C., Jefferson Hospital.
1948. Tait, Edwin Forbes, 1324 Main St., Norristown, Pa.
1943. Tassman, Isaac S., 136 S. 16th St.
1946. Tauber, Robert, 2019 Walnut St.
1952. Taylor, Ann Gray, 6364 Germantown Ave.
1933. Taylor, Herbert W., Haverford, Pa.
1931. Taylor, Norman H., 100 W. Evergreen Ave.
1952. Teague, Russell E., 9 Grange Rd., Wayne, Pa.
1951. Theodos, Peter A., 1930 Chestnut St.
1946. Thomas, Carmen C., 1930 Chestnut St.
1928. Thomas, J. Earl, Drexel Hill, Pa.
1952. Thompson, Charles M., 255 S. 17th St.
1927. Thorington, J. Monroe, 2031 Chestnut St.
1936. Thornton, Mary Bickings-, 2703 West Somerset St.
1936. Thorp, Francis Quicksall, 4900 Penn St.

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COLLEGE OF PHYSICIANS
OF PHILADELPHIA

1936. Thudium, William J., 136 S. 16th St.
1935. Tocantins, Leandro Maués, 1025 Walnut St.
1945. Toland, Joseph J., Jr., 1241 W. Lehigh Ave.
1935. Toland, Owen J., Episcopal Hospital, Front and Lehigh Ave.
1952. Tondreau, Roderick L., 227 Crosshill Rd., Penn Wynne, Pa.
1952. Tompkins, Winslow T., 330 S. 9th St.
1949. Tornay, Anthony S., 37 S. 20th St.
1945. Tourish, William J., 1115 Childs Ave., Drexel Hill, Pa.
1949. Town, Arno E., 255 S. 17th St.
1936. Towson, Charles Emory, Germantown Professional Bldg.
1908. Tracy, Stephen E., Old Arch Rd., Norristown, Pa.
1947. Trueman, Robert H., 1930 Chestnut St.
1926. Tucker, Gabriel, 250 S. 18th St.
1938. Tuft, Louis, 1530 Locust St.
1933. Tumen, Henry J., 1900 Rittenhouse Sq.
1938. Turman, Christopher M., Wyncote, Pa.
1923. Turner, Creighton H., 1731 Pine St.
1952. Twining, H. Earle, 2026 Delancey St.
1945. Twyeffort, Louis H., 111 N. 49th St.
1929. Tyson, Ralph M., 255 S. 17th St.
1937. Uhle, Charles A. W., 255 S. 17th St.
1950. Ullery, John C., 255 S. 17th St.
1907. Ullom, Josephus T., Carpenter and Quincy Sts.
1950. Valdes-Dapena, Antonio, 101 Washington Ave. Havertown, Pa.
1937. Vander Veer, Joseph B., 330 S. 9th St.
1937. Van Loon, Emily Lois, 1930 Chestnut St.
1933. Vastine, Jacob H., 2nd, 136 S. 16th St.
1947. Vastine, Mary F., Woman's Medical College of Pa.
1952. Vischer, Thomas J., 5903 Greene St.
1940. Voegelin, Adrian W., Germantown Professional Bldg.
1941. Vogel, Stoughton R., 246 W. Walnut Lane.
1903. Wadsworth, William S., 4632 Hazel Ave.
1927. Wagers, Arthur J. 1429 Spruce St.
1949. Wagner, Frederick B., Jr., 251 S. 41st St.
1949. Wagner, Joseph A., 2720 Darby Rd., Havertown, Pa.
1928. Wagoner, George W., Medical Bldg., Bryn Mawr, Pa.
1938. Waldman, Joseph, 404 Meadowbrook Lane.
1952. Walker, James M., 3400 Spruce St.
1906. Walker, John K., 139 Little Lane, Haverford, Pa.
1907. Walker, Warren, 511 Lynmere Rd., Bryn Mawr, Pa.
1932. Walkling, Adolph A., 136 S. 16th St.
1932. Watt, Charles C., Jr., 100 W. Coulter St.
1933. Waygood, James Jamison, 3464 School Lane.
1952. Weaver, Harry S., Jr., 37 S. 20th St.
1941. Weaver, Ruth H., 2601 Parkway.
1930. Weeder, S. Dana, 250 W. Tulpehocken St.
1920. Weidman, Fred D., 20 Tenby Rd., Havertown, Pa.
1952. Weinstein, George L., 255 S. 17th St.
1933. Weiss, Benjamin P., The Lenox, 13th and Spruce Sts.
1923. Weiss, Edward, 269 S. 19th St.
1950. Weiss, Sidney, 1930 Chestnut St.
1951. Welty, Jack W., Montgomery Ave. & Owen Rd., Wynnewood, Pa.

1935. Whelan, G. L., 2100 Walnut St.
1921. Whitaker, William, 4645 Oakland St.
1936. White, Ellen Pawling Corson-, Route #2, Fort Myers, Fla.
1925. Widmann, Bernard P., 250 S. 18th St.
1936. Wilder, Theodore S., 6013 Greene St.
1935. Willard, John Harrington, 344 S. 15th St.
1939. Willauer, George, 6129 Greene St.
1907. Williams, Carl, School Lane and Greene St.
1937. Williams, John C., 6370 Germantown Ave.
1920. Williams, Philip F., 2206 Locust St.
1950. Williams, R. G., Medical School, Univ. of Pa.
1927. Williamson, Ernest G., 6353 Woodbine Ave.
1949. Willson, J. Robert, 3401 N. Broad St.
1921. Wilson, George, 133 S. 36th St.
1945. Wilson, John F., 1930 Chestnut St.
1942. Wilson, Lucius R., 1305 Morris Road, Wynnewood, Pa.
1937. Wilson, Ross B., 1820 S. Rittenhouse Sq.
1949. Wilson, William W., 133 S. 36th St.
1948. Winkelman, Nathaniel W., 1911 Spruce St.
1948. Winston, Julius, 5339 Chester Ave.
1941. Wirts, C. Wilmer, 2017 Delancey St.
1904. Wister, James W., 5430 Germantown Ave.
1933. Wohl, Michael G., 1727 Pine St.
1944. Wolf, Lewis R., 3474 Frankford Ave.
1918. Wolfertii, Charles C., 133 S. 36th St.
1942. Wolman, Irving J., Lakeside Apts.
1893. Wood, Alfred C., 2035 Walnut St.
1950. Wood, Dorothy D., 2035 Walnut St.
1932. Wood, Francis C., 212 Laurel Lane, Haverford, Pa.
1900. Wood, George B., 329 Hathaway La., Wynnewood, Pa.
1903. Wood, Horatio C., Jr., 319 S. 41st St.
1944. Wood, H. Curtis, Jr., Skippack Pk., Whitemarsh, Pa.
1928. Wright, Carroll S., 1402 Spruce St.
1937. Yaskin, Joseph C., 1832 Spruce St.
1943. Yawger, Nathaniel S., Exeter Rd., Haverford, Pa.
1921. Ylvisaker, Lauritz S., P. O. Box 268, Bryn Mawr, Pa.
1941. Young, Barton R., Germantown Hospital.
1946. Zeigerman, Joseph H., 1836 Delancey St.
1894. Zentmayer, William, 265 Forrest Rd., Merion, Pa.
1952. Zillessen, Frederick O., Jeanes Hospital.
1947. Zintel, Harold A., Univ. of Pa. Hospital.
1949. Zintl, William J., Upper Darby, Pa.
1933. Zulick, J. Donald, Abington Memorial Hospital, Abington, Pa.

Associate Fellows

ELECTED

1951. Shorey, Jeanette McC., University Hospital, 36th & Spruce Sts.
1952. Talbot, Timothy R., Jr., University Hospital, 36th & Spruce Sts.

Non-Resident Fellows

ELECTED

1912. Addison, William H. F., 286 East Sidney Avenue, Mt. Vernon, N. Y.
1941. Aronson, Roland S., Medical Laboratory, Ft. McPherson, Ga.
1934. Bank, Joseph, 800 N. First Ave., Phoenix, Arizona.
1932. Behney, Charles A., 4030-C Urban St., Los Alamos, N. M.
1949. Bixby, Edward W., 61 W. Ross St., Wilkes-Barre, Pa.
1937. Braceland, Francis J., The Institute of Living, 200 Retreat Av., Hartford, Conn.
1948. Brogan, Edmond J., 129 Summit Ave., Summit, N. J.
1948. *Brown, Robert B., U. S. Naval Hospital, Bethesda, Md.
1908. Cadbury, William W., 274 W. Main St., Moorestown, N. J.
1936. Camero, Anthony R., 657 S. Westlake Ave., Los Angeles, Cal.
1941. Cheleden, John, 1206 E. Ocklawaha Ave., Ocala, Florida.
1930. Clarke, Francis Mann, 116 New St., New Brunswick, N. J.
1930. Cottrell, James E., Kennedy Veteran's Administration Hospital, Memphis, Tennessee.
1940. Crowe, Aldrich C., 735 Atlantic Ave., Ocean City, N. J.
1947. Cutler, Norman L., 1300 Harrison St., Wilmington, Del.
1941. *Cuttle, Tracy D., U. S. Navy, Chelsea, Mass.
1941. Dixon, Harold M., 1624 N. Harrison St., Little Rock, Ark.
1897. Dorland, W. A. Newman, 609 Azeela St., Tampa, Fla.
1951. Ellis, Mackinnon, Mountain Home Veteran's Hospital, Mountain Home, Tenn.
1951. Ervin, Carl E., 240 North Third Street, Harrisburg, Pa.
1944. Estes, W. L., Jr., Bethlehem, Pa.
1952. Faller, Constantine P., 127 State St., Harrisburg, Pa.
1940. Forrester, James S., Harrisburg Polyclinic Hospital, Harrisburg, Pa.
1946. Forster, Francis M., Georgetown University Hospital, Washington, D. C.
1933. Fowler, Kenneth, 2535 Horton Ave., San Diego, Cal.
1947. Gaskill, Herbert S., 4528 College Ave., Indianapolis 5, Ind.
1913. Gates, Nathaniel, 10 Peterboro, Detroit, Mich.
1931. Gilman, Robert Louis, Cheyney, Pa.
1947. Grady, Hugh G., Armed Forces Institute, Washington, D. C.
1952. Grieco, Reynold M., 2 W. 4th St., Williamsport, Pa.
1936. Guthrie, Donald, 118 S. Wilbur Ave., Sayre, Pa.
1902. Gwyn, Norman B., 109 Madison Ave., Toronto, Canada.
1936. Hatch, Lerleen Clement, 2184 Ayers Ave., Akron, Ohio.
1928. Hayman, Joseph Marchant, Jr., Lakeside Hosp., 2065 Adelbert Rd., Cleveland, Ohio.
1933. Hitzrot, Lewis H., Medical Director, Mercersburg Academy, Mercersburg, Pa.
1936. Hughes, Brady A., 312 Euclid Ave., Mt. Brook, Birmingham, Ala.
1899. Jopson, John H., Rutherfordton, N. C.
1947. Kelchner, Clyde H., 1125 Turner St., Allentown, Pa.
1931. Kinney, Willard H., 7300 Atlantic Ave., Ventnor, N. J.
1942. Kneedler, William H., 609 N. Statesville Rd., Davidson, N. C.
1944. LaMotte, William O., Medical Arts Building, Wilmington, Del.
1952. Levan, John B., 401 Oley St., Reading, Pa.
1948. Livingood, Clarence S., School of Medicine, Univ. of Texas, Galveston, Texas.
1948. McLaughlin, John T., 1252 S. Central Ave., Glendale, Calif.
1949. Manlove, Francis R., 535 N. Dearborn St., Chicago, Ill.
1935. Mason, James B., 4677 S. 34 St., Arlington, Va.

* Military Service.

1935. Matthews, Robert A., 1542 Tulane Ave., New Orleans, La.
1951. *Mayock, Robert L., Fitzsimons A. Hospital, Denver, Colo.
1932. Meade, Richard H., Jr., 750 San Jose Dr., Grand Rapids, Mich.
1936. Middleton, William Shainline, 2114 Adams St., Madison, Wisconsin.
1928. Moon, Virgil H., Univ. of Miami, Coral Gables, Fla.
1949. Motley, Hurley L., Hospital of Good Samaritan, Los Angeles, Calif.
1937. Nicholson, Samuel T., 2d., 642 High St., Pottstown, Pa.
1905. Norris, George W., Dimock, Pa.
1952. Nutt, John B., 416 Pine St., Williamsport, Pa.
1926. Paul, John Rodman, Dept. Internal Medicine, Yale University, New Haven, Conn.
1947. Pearce, Louise, Trevenna Farms, Belle Mead, N. J.
1922. Pleasants, Henry, West Chester, Pa.
1938. Read, Hilton S., 5407 Atlantic Ave., Atlantic City, N. J.
1937. Reimann, Hobart A., American Univ. of Beirut, Lebanon.
1936. Reisinger, John A., 901 20th St., N. W., Washington, D. C.
1907. Royer, B. Franklin, 429 E. Baltimore St., Greencastle, Pa.
1945. Schell, James F., Veterans Hospital, New Castle, Del.
1928. Schofield, Frederick S., Veteran's Admin. Hospital, Beckley, W. Va.
1913. de Schweinitz, George L., 85 E. Broad St., Bethlehem, Pa.
1941. Shands, Alfred R., Jr., Alfred I. duPont Institute, Rockland Rd., Wilmington, Del.
1908. Shannon, Charles E. G., 9 Park St., Waterville, Maine
1943. Shewbrooks, Daniel N., The Acacia Mutual Life Ins. Co., Washington, D. C.
1950. Shiffer, Paul H., 111 N. 7th St., Stroudsburg, Pa.
1951. *Shorey, Winston K., Haverford Villa B208, Haverford, Pa.
1932. Siegel, Alvin Erdreich, Medical Arts Building, Macon, Ga.
1933. Smelzer, Donald C., Lancaster General Hospital, Lancaster, Pa.
1929. Sponsler, Marshall B., 103 Lansdowne Road, DeWitt, N. Y.
1934. Stewart, Sloan G., Pacific and North Carolina Avenues, Atlantic City, N. J.
1931. Stiles, Merritt H., 820 S. McClellan St., Spokane, Wash.
1942. Thompson, Wesley D., 18 N. Main St., Lewistown, Pa.
1941. Tompkins, Pendleton, 450 Sutter St., San Francisco, California.
1913. Vail, William Penn, Blairstown, N. J.
1912. Vaux, Norris W., Glenmore Farms, Glen Moore, Pa.
1897. Veasey, Clarence Archibald, W. 1118–9th Ave., Spokane, Washington.
1931. Walker, Herschel Carey, 320 Park Ave., New York City, N. Y.
1914. Willard, De Forrest P., Sea Island, Ga.
1952. Wood, Horatio C., III, 4309 Prospect Rd., Peoria, Ill.

Honorary Fellows

Limited to Fifty, of Whom Twenty May be Foreigners

American

ELECTED

1949. Alexander, John, Univ. of Michigan Hospital, Ann Arbor, Mich.
1947. Longcope, Warfield Theobald, Johns Hopkins Hospital, Baltimore, Md.
1917. Miner, Charles Howard, B.S., M.D., Member of Board of Directors, Wilkes-Barre General Hospital; Board of Health, Wilkes-Barre; Board of Directors, White Haven Sanitarium Association and Penna. Tuberculosis Society. 264 S. Franklin St., Wilkes-Barre, Pa.
1936. Richards, Alfred Newton, Ph.D., Sc.D., M.D. (hon.), L.L.D., Emeritus Professor of Pharmacology, School of Medicine and Associate Trustee, University of Pa.

1942. Russell, Frederick Fuller, M.D., Brig. Gen. Med. Corps, U. S. A. (Ret.). 4938 Brownsboro Road, Louisville, Kentucky.

1947. Stone, Robert Spencer, Univ. of California Medical School, San Francisco, Calif.

Foreign

1937. Dale, Sir Henry Hallett, C.B.E., F.R.S., M.A., M.D., F.R.C.P., Director, National Institute for Medical Research. The Wellcome Trust, 28 Portman Sq., London, W. C. England.

1922. McCarrison, Sir Robert, K.T., C.I.E., M.D., D.SC., LL.D., F.R.C.P., Major-General, Indian Medical Service (retired). 18 Linton Rd., Oxford, England.

Honorary Associates

1942. Donner, William Henry, Fidelity-Philadelphia Trust Bldg., Philadelphia, Pa.

Necrological List

Resident Fellows	*Date of Election*	*Date of Death*
J. Harold Austin	January 7, 1914	March 29, 1952
Eugene A. Case	October 4, 1922	April 20, 1952
Louis Cohen	January 4, 1949	February 23, 1952
Louis Lehrfeld	March 4, 1936	February 6, 1952
Charles-Francis Long	January 10, 1938	February 28, 1952
Howard Y. Pennell	May 9, 1932	March 30, 1952
Harry Stuckert	January 9, 1933	March 3, 1952
George Woodward	May 5, 1897	May 25, 1952
Non-Resident Fellows		
Charles A. E. Codman	March 4, 1908	August 31, 1952
Honorary Associate Fellow		
Edwin G. Conklin	October 14, 1942	November 21, 1952

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